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ABSTRACT

Because the key agent in mathematics and science reform is the teacher, this issue of the Eisenhower National Clearinghouse for Mathematics and Science Education (ENC) Focus highlights professional development. Whatever curriculum change is adopted in a school district, whatever new textbook series is chosen, it is through the teacher that the program will be adapted and translated into classroom activities and assignments. This issue lists 31 resources (books, videotapes, C-D Roms, the Internet) related to professional development in mathematics and science education. The resources featured in this issue were selected from the existing collection at ENC and can be used in a variety of settings from self-study to group study, in consultation with peers and supervisors, and as part of an inquiry into practice or an action research project. (ASK)

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Volume 4, Issue 4, 1997

ED 413 183

enc FOCUS

For Mathematics and Science Education

Professional Development for Math and Science

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enc Eisenhower National Clearinghouse

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Using ENC to learn more about software

The Eisenhower National Clearinghouse for Mathematics and Science Education was established to help K–12 teachers locate useful teaching materials. The Clearinghouse collects all types of materials at the National Repository in Columbus, Ohio, at The Ohio State University. ENC makes information available about all of these resources in several ways. For example, this print catalog is one of a series that highlights specific topics and resources in math and science. All of ENC's resources in combination will provide comprehensive information for teachers on a variety of topics, including CD-ROMs and laserdiscs.

ENC Online

ENC Online has links to exemplary science and math Internet sites through the Digital Dozen, selected monthly, classroom links, and other educational resources. Some Internet sites are available with information about using technology in the classroom. You can find them in two ways: search Resource Finder, or browse through the links on ENC Online. If you have time to browse, you will find all kinds of things you might be able to use in your classroom. ENC Online also links to some of the full-text articles featured on ENC CDs.

ENC CDs

ENC's CD-ROMs have a variety of previously published documents in electronic format about curriculum issues in math and science education, including curriculum support materials, State curriculum frameworks, and articles from professional journals. These documents cover curriculum standards and implementation, and include the complete 1989 *NCTM Curriculum and Evaluation Standards for School Mathematics*. These documents and other valuable materials are included on ENC's CD-ROMs, which are available free to schools.

ENC Demonstration Sites

Located throughout the country, these 12 sites can be found at or in conjunction with the 10 Eisenhower Regional Consortia (see inside back cover), at the Capital Collection & Demonstration Site at George Washington University in Washington, DC, and at ENC. Teachers and other educators can visit or contact the Site in their area for a complete demonstration of ENC's services as well as assistance in locating educational materials and using new technologies.

Teacher contributions to ENC

To create a better service, ENC needs the help of the Nation's educators. ENC Online's newest tool, the Professional Development Exchange, offers one place where educators can both submit and search for professional development events and opportunities, such as workshops, conferences, or grant monies. However, this tool will only be useful if educators use and contribute to it. For more information, visit ENC Online at <http://www.enc.org>.

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U. S. Department of Education	***Office of Educational Research and Improvement***	***Office of Reform Assistance and Dissemination***
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ENC Focus

Professional Development for Math and Science

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About ENC Focus

ENC Focus is published periodically by the Eisenhower National Clearinghouse for Mathematics and Science Education, funded through Contract No. R392126001 from the U.S. Department of Education's Office of Educational Research and Improvement (OERI). The ideas and opinions expressed in this publication do not necessarily reflect the positions or policies of the Department of Education or OERI.

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For help with ENC's online services, call the technical help desk at (614) 292-9590 or send e-mail to help@enc.org

To request any issue of the Focus series, contact ENC at the address above, or e-mail editor@enc.org. While some issues are out of print, all are available online or on CD-ROM.

Past titles include *Active Learning with Hands-on Resources, Integrating Math and Science, New Approaches to Assessment in Science and Mathematics, Calculator-Active Materials,* and *CD-ROMs and Laserdiscs for Science.*

How to Connect to ENC Online

To connect to ENC Online via the Internet, visit ENC's World Wide Web site at: <http://www.enc.org>. You can also telnet to enc.org; via modem dial (800) 362-4448 or (614) 292-9040. Set your communication software to VT100 terminal emulation, no parity, 8 data bits, 1 stop bit, and full duplex. Once connected, press <RETURN> to bring up a screen and type c to connect. All the information you need to use ENC is on the screen.

ENC Reference Services

People with questions related to K–12 math or science education can call the ENC Resource Center's reference staff. Services include assistance with locating teaching materials, conducting research, and making effective use of ENC Online and the Resource Finder, ENC's catalog of curriculum resources. Call the Reference Desk at (800) 621-5785 or dial (614) 292-9734. Questions can also be sent via e-mail at library@enc.org.

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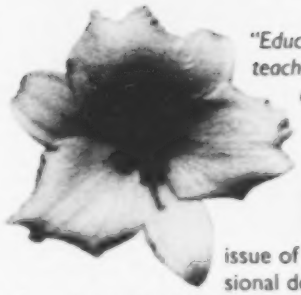
ENC Focus

Professional Development for Math and Science



"Educational change depends on what teachers do and think—it's as simple and as complex as that." (Fullan and Steigelbauer, 1991, p. 117)

Because the key agent in mathematics and science reform is the teacher, this issue of *ENC Focus* highlights professional development. Whatever curriculum change is adopted in a school district, whatever new textbook series is chosen, it is through the teacher that the program will be adapted and translated into classroom activities and assignments. How to support teachers as they revitalize their teaching—through whatever means and materials—concerns the educational community as a whole, parents and school principals as well as staff developers.

The current reform movement requires a fundamental shift in teaching practices, and change is difficult. The inservice teacher has spent years constructing a highly individual professional self, incorporating personal conceptions and experiences of teaching and learning, as well as strong beliefs about good instructional techniques. Cohen and Ball made this comment on the deeply personal nature of professional development: "And changing one's teaching is not like changing one's socks. . . . Teaching is less a set of garments that can be changed at will than a way of knowing, of seeing, and of being." (1990, p. 162).

What is needed is professional development that is dramatically different—not just in content, but also in form of delivery and level of commitment. Learning must move beyond the "sit and get" model of one-shot workshops, conferences, inservice days, and graduate courses that have no connection with the real work of schools. Professional development should be ongoing, intensive, and integral to a teacher's regular work day. As envisioned in reform documents (National Council of Teachers of Mathematics, 1991; National Research Council, 1996), the essential characteristics of quality programs include:

- clear, shared goals based on a vision of learning, teaching, and teacher development;
- integration and coordination of the program components so that understanding and ability can be built over time, reinforced continuously through in-classroom support, and practiced in a variety of situations;
- options that recognize the developmental group and individual interests, as well as the needs of teachers who have varying degrees of experience, professional expertise, and proficiency;
- modeling of good mathematics and science teaching;
- multiple perspectives on students as learners;
- teachers taking an active role in their own professional development as they reflect on their instructional strategies;
- experiences that engage prospective and practicing teachers in active learning and are appropriately connected to teachers' work in the context of the school.

Materials Featured in This Issue

The resources featured in this issue can be used in a variety of settings: from self study to group study; in consultation with peers and supervisors; and as part of an inquiry into practice or an action research project. All of the above are examples of the new vision of professional development. It is important that these resources be used with a partner or with a support group of at least one. This allows the participants to discuss the materials, reflect on their real implications, and provide mutual support as they try out a new instructional technique. The materials are not meant to be prescriptive, nor equally suitable for all users, but to suggest ideas and possibilities.

Mathematics and Science Standards

The Professional Standards for Mathematics Teaching (1991) gives an overview of what teachers need to know and of how teaching should be evaluated if math instruction is to achieve National Council of Teachers of Mathematics (NCTM) goals. Designed by a cross-section of the mathematics education community, including classroom teachers, supervisors, researchers, and university instructors, the document illustrates each standard through detailed teaching vignettes. It is a primary resource for any discussion of change in the math classroom. Several selections deal with children making sense of mathematical ideas.

The National Science Education Standards (NSES) (1996) reflects the principle that learning science is an inquiry-based process and includes standards for teaching and professional development. The standards for teaching focus on what teachers need to know and do, while the professional development standards are concerned with how teachers develop professional knowledge and skill. Another book that can help high school teachers implement the science standards is the National Science Teachers Association's (NSTA) *Pathways to the Science Standards*. This document goes along with the NSES, discussing both the teaching and professional development standards and providing specific examples and vignettes for the high school teacher.

Professional Development for Math and Science

Mathematics and Science Resources

Talking Mathematics focuses on elementary students communicating about math problems. Examples of children engaging in math talk and explanations of how to support this type of discourse are illustrated in several videos and accompanying books. This resource also speaks to teachers' need to communicate their own understandings of mathematics within a study group setting. A similar series, *Learning to See: Observing Children's Inquiry in Science*, was designed to help K–6 teachers understand the role of exploration in children's science learning. The series includes videotapes of students exploring various scientific phenomena and their verbalizations of what they think is happening.

Two interactive CD-ROMs, *Understanding Teaching: Implementing the NCTM Professional Standards for Teaching Mathematics* and *Learning About Teaching* show teachers how to reflect upon and examine their own teaching. These resources open classroom doors, invite the user to observe math classes in action, and encourage reflection on what was observed.

Because assessment is also an important topic, this issue includes resources such as *A Toolkit for Professional Developers: Alternative Assessment* and *Assessing Hands-on Science: A Teacher's Guide to Performance Assessment*. The "toolkit" is a compilation of activities and supporting materials developed for K–12 teachers as an alternative assessment resource. It is also a means of engaging teachers in dialogue about changing the ways mathematics and science have been traditionally taught and assessed. The emphasis is on alternative means of assessment, such as short answer, essays, performances, oral presentations, demonstrations, and portfolios. *Assessing Hands-On Science* discusses how to use performance assessments to measure student learning in a hands-on curriculum.

Additional Resources

The TechKNOWLEDGEy series is designed to help all teachers understand and use computer technology in their classrooms. Two items highlighted in this issue cover the topics of managing and using equipment in the primary and middle school classroom, with guidelines for integrating technology with existing curricula. The topics of cognitive type theory, learning style, and multiple intelligences are covered in video and print from the Association for Supervision and Curriculum Development (ASCD). These resources provide practical guidance and explore the implications of these theories for classroom practice and school programs.

The Internet sites chosen for this publication include those of professional organizations such as NCTM and NSTA, as well as other sites that include information about programs for professional development. The Fermilab LInC Web site provides all the course materials for 20 four-hour sessions on how to integrate Internet resources into the curriculum. The training package includes topics such as identifying effective teaching strategies for using telecommunications, learning how to find and access Internet resources, and publishing documents on the Internet. In another site, *Tales from the Electronic Frontier*, 10 teachers share actual classroom experiences using the Internet in math and science. This online document—also available in print—helps teachers expand classroom resources, engage students in new ways, connect with other teachers, access online resources, and solve technical problems.

The resources featured in this issue were selected from the existing collection at ENC at the time of publication. Subject terms such as "professional development" and "instructional issues" were used in our initial searches. We limited our searches using various grade levels, resource type (such as "World Wide Web" or "videotape" or "professional guide"), and other subject terms. Our collection is not yet comprehensive and many new professional development resources are being created. We continue to add resources to our collection, so be sure to search our online catalog, Resource Finder, for other professional development resources not highlighted in this issue. Please let us know of other professional development materials that you would highly recommend via e-mail at submit@enc.org. We will do everything possible to include them in our collection of resources. ENC is committed to the continuing professional development of teachers and to helping their ongoing effort to revitalize their practice.

Terese A. Herrera and Kimberly S. Roempler

References

Cohen, D. and Ball, D. L. (1990). Relations between policy and practice: A commentary. In D. Cohen & P. Peterson (Eds.), *Effects of state-level reform of elementary school mathematics curriculum on classroom practice: Final report* (pp. 159–165). East Lansing, MI: National Center for Research in Teacher Education.

Fullan, M. and Steigelbauer, S. (1991). *The new meaning of educational change* (2nd ed.). New York: Teachers College Press.

National Council of Teachers of Mathematics. (1991). *Professional standards for teaching mathematics*. Reston, VA: Author.

National Research Council. (1996). *National science education standards*. Washington, DC: National Academy Press.

Professional Development for Math and Science

Items Featured in This Issue

Title	Grades	Price	Pg
Professional Standards for Teaching Mathematics	K–12	$25.00	5
National Science Education Standards	K–12	$19.95	6
A Teacher's Guide to Cognitive Type Theory and Learning Style	K–12	$18.95	7
A Toolkit for Professional Developers: Alternative Assessment	K–12	$60.60	8
Algebra in a Technological World	9–12	$15.00	9
Assessing Hands-on Science: A Teacher's Guide to Performance Assessment	K–12	$25.00	10
Beyond Arithmetic: Changing Mathematics in the Elementary Classroom	K–5	$13.95	11
Doing Science: Innovative Curriculum for the Life Sciences	9–12	$19.95	12
Double-Column Addition: A Teacher Uses Piaget's Theory	K–5	$55.00	13
GEMS Teachers Handbook	PreK–10	$9.00	14
The Architecture of Reform: GEMS Meets the National Standards	PreK–10	$9.00	14
Learning in Science: The Implications of Children's Science	5–10	$23.00	15
Managing Technology in the Middle School Classroom	5–8	$21.95	16
Math Makes Sense: Teaching and Learning in Context	K–8	$23.00	17
Mathematics for Middle School, Part 1	6–8	$89.00	18
Mathematics with Reason: The Emergent Approach to Primary Maths	PreK–6	$23.00	19
Science with Reason	K–7	$19.50	19
Mathematics: Teaching for Understanding (K to 6)	K–6	$225.00	20
The Multicultural Math Classroom: Bringing in the World	3–7	$25.00	21
NSTA Pathways to the Science Standards	9–12	$24.95	22
Talking Mathematics: Resource Package for Staff Developers	K–12	$450.00	23
The Mystery of the Moving Can: Problem Solving	K–6	$110.00	24
Strategies for Teaching Physical Science: Facilitator's Manual	K–12	$30.00	25
Thinking Through Mathematics: Fostering Inquiry and Communication in Mathematics . . .	9–12	$16.00	26
Inquiry and Learning: Realizing Science Standards in the Classroom	K–12	$16.00	26
Understanding Teaching: Implementing the NCTM Professional Standards for Teaching . . .	K–12	$300.00	27
Young Children Reinvent Arithmetic: Implications of Piaget's Theory	1	$18.95	28
Mr. Wizard: Wood	K	$25.70	29
Writing in Math Class: A Resource for Grades 2 to 8	2–8	$18.95	30
About Science IMAGES: Visions of Effective Science Instruction	1–8	$315.00	31
Teaching Math: A Video Library, 9–12	9–12	$250.00	32

* *Please see record for details.*

Pricing and ordering information were verified in June 1997 and are subject to change.

Grades K–12

Professional Standards for Teaching Mathematics

1991

Publisher

National Council of Teachers of Mathematics (NCTM)
1906 Association Drive
Reston, Virginia 20191-1593
Telephone: (703) 620-9840
Fax: (703) 476-2970
URL: <http://www.nctm.org>

1 text: ISBN: 0-87353-307-0; Order #: 439
$25.00
Note: 20% discount to individual NCTM members.

Author

Prepared by the Working Groups of the Commission on Teaching Standards for School Mathematics of the National Council of Teachers of Mathematics

This book, designed for classroom mathematics teachers, establishes professional teaching standards to guide reform in school mathematics. It is divided into sections that describe standards for the following areas: mathematics instruction, evaluation of instruction, professional development opportunities, and the support and development of mathematics teachers and teaching. In the first section, detailed explanations describe how to teach at different levels, outlining each of the NCTM *Curriculum and Evaluation Standards for School Mathematics* (1989). Annotated vignettes illustrate situations in which good mathematics teaching and learning may take place. The second section offers guidance to teachers seeking self-improvement, to colleagues mentoring others, and to supervisors and others who are involved in the evaluation of teaching. The vignettes in this section illustrate a variety of assessment activities and show a range of personnel involved in evaluation. In the third section, the focus is on the following aspects of both preservice and inservice teachers' professional development: experiencing good mathematics teaching; knowing mathematics and school mathematics; viewing students as learners of mathematics; knowing mathematical pedagogy; developing as teachers of mathematics; and understanding teachers' roles in professional development. The fourth section highlights responsibilities and ways in which policymakers, schools, school systems, colleges, universities, and professional organizations may support teachers in actualizing the vision of teaching needed to support the implementation of the NCTM *Standards*. The book concludes by discussing such issues as the role of standards in the reform of school mathematics, integration with other disciplines, and the importance of research. (Author/VN) [ENC-001451]

Related Resources

ENC also has the following resources from NCTM in its collection:

Curriculum and Evaluation Standards for School Mathematics
This document contains a set of standards for developing mathematics curricula in K–12 schools and for evaluating the quality of both curricular programs and student performance. This NCTM document, designed to establish a broad framework to guide reform in school mathematics, presents standards divided among four sections: K–4; 5–8; 9–12; and evaluation. Each standard begins with a statement of mathematical content, followed by a description of student objectives and a detailed discussion with instructional examples. The first four curriculum standards in each section are problem solving, communication, reasoning, and connections. Specific content standards for primary, middle, and high school levels are then presented, along with a rationale for inclusion and sample activities intended to convey the spirit of the mathematical content and instruction. The evaluation section is presented separately in 14 strands organized into three categories: general assessment, student assessment, and program evaluation. [ENC-002280]

Assessment Standards for School Mathematics
The third book in the NCTM Standards series, this document serves as a guide for examining current assessment practices and planning new ones. A central theme is that the assessment of student achievement should be based on information obtained from a variety of sources, especially by teachers during the process of instruction. [ENC-003554]

Grades K–12

National Science Education Standards

1996

Publisher

National Academy Press
2101 Constitution Avenue NW
Washington, DC 20418
Telephone: (202) 334-3313
Toll free: (800) 624-6242
URL: <http://www.nap.edu/>

1 text: ISBN: 0-309-05326-9 **$19.95**
Note: Receive 20% discount when ordering online.

Author

National Research Council (NRC)

Standards

National Science Education Standards (NSES) (December 1995)

Evaluation Information

This resource was reviewed for and included in the 1996 publication *Resources for Teaching Elementary School Science* [ENC-001371], a listing of effective hands-on, inquiry-based curriculum materials for grades K–6.

Funding

National Science Foundation (NSF); United States Department of Education (ED); National Aeronautics and Space Administration (NASA); National Institutes of Health (NIH); National Academy of Sciences; Volvo North American Corporation; Ettinger Foundation, Inc.; Eugene McDermott Foundation

The *National Science Education Standards* (NSES) describes an educational system in which all students demonstrate high levels of performance, in which teachers are empowered to make the decisions essential for effective learning, and in which supportive educational programs and systems nurture achievement. The standards are guided by the following principles: science is for all students; learning science is an active process; school science reflects the intellectual and cultural traditions that characterize the practice of contemporary science; and improving science education is part of systemic education reform. The topics addressed include science teaching, professional development, assessment, science content, science programs, and systems. The document describes the conditions necessary to achieve the goal of scientific literacy for all students. The standards for teaching focus on what teachers know and do, while the professional development standards are concerned with how teachers develop professional knowledge and skill. The science assessment standards are criteria with which to evaluate assessment practices and can be used as guides in developing such practices. The standards for content define what the scientifically literate person should understand and be able to do after 13 years of schooling. Organized by grade clusters (K–4, 5–8, and 9–12), these standards define content to include the following: inquiry; the traditional areas of physical, life, and Earth sciences; connections between science and technology; science in personal and social perspectives; the history and nature of science; and unifying concepts and processes. The content standards are supported by information on developing student understanding and by examples and vignettes describing teaching and assessing for understanding. The program standards provide criteria for judging the quality of and conditions for school and district science programs. These standards are concerned with opportunities for students to learn and for teachers to teach science. Finally, the science education system standards establish criteria for evaluating how well the science education system provides schools with the financial and intellectual resources necessary to achieve the national standards. References are provided for each standard. (Author/KSR) [ENC-006101]

Related Resources

ENC has other items related to science standards in its collection:

Science for All Americans
This book outlines what all students should know and be able to do by the time they leave high school. Recommendations for science literacy are presented thematically and cover four major categories: the nature of science, mathematics, and technology as human enterprises; basic knowledge about the world; the history of the scientific endeavor and the tools for thinking about how the world works; and the habits of mind that are essential for science literacy. Chapters deal with major sets of related topics and feature headings that identify the conceptual categories with which all students should be familiar. Within each chapter are paragraphs that express the residual knowledge, insights, and skills that people should possess after the details have faded from memory. Also included is recommended vocabulary. The last section discusses the principles of teaching and learning. [ENC-001742] Oxford University Press, toll-free: (800) 334-4249

Grades K–12

A Teacher's Guide to Cognitive Type Theory and Learning Style

1996

Publisher

Association for Supervision and Curriculum Development (ASCD)
Orders
1250 North Pitt Street
Alexandria, VA 22314-1453
Telephone: (703) 549-9110
Toll-free: (800) 933-2723
Fax: (703) 299-8631
URL: <http://www.ascd.org/>

I text: ISBN: 0-87120-278-6 **$18.95**

Author

Carolyn Mamchur

This book was developed to provide educators with a practical explanation of cognitive theory types and learning styles, allowing them to meet the needs of others while also discovering their own strengths as teachers and colleagues. Part I introduces Carl Jung's theory of psychological preferences and discusses the importance of the Myers-Briggs Type Indicator in identifying people's tendencies for extraversion, introversion, sensing, and intuition, as well as for thinking, feeling, judging, and perceiving. The eight tendencies are examined in the context of teaching and learning. Each explanation is accompanied by a case study showing how that tendency might influence classroom practice. Related readings on learning style and type theory in Part II of this book allow teachers to determine their own tendencies, to examine the potential benefits and dangers of putting labels on human behavior, and to focus on temperament, motivation, and reluctant learners. A glossary and an instrument for determining type preferences of adolescents are included as appendices. (Author/LCT) [ENC-008743]

► Related Resources

ENC has other resources in its collection that deal with the classroom application of cognitive theory:

Multiple Intelligences in the Classroom
This video-based staff development program introduces Howard Gardner's theory of multiple intelligences and explores its implications for classroom practice and school programs. The three video workshops were developed for administrators, teachers, and parents, as well as school board members and corporate and community leaders. Part I, Understanding Multiple Intelligences, examines Gardner's theory of multiple intelligences, presents examples of adults and K–12 students with distinct intelligence strengths, and examines implications of the theory for schools. Part II, Classroom Applications, highlights four schools that have incorporated the theory of multiple intelligences into their curricula. It illustrates what diverse multiple intelligence classrooms look like, outlines steps to take in establishing classroom models, and demonstrates how to plan curricula based upon Gardner's theory. Part III, Creating the School of the Future, explores how applying the theory of multiple intelligences enhances educational practice. Viewers learn how new assessment strategies, parental involvement, and a strong community connection can improve educational experience. Each videotape in this series is accompanied by a facilitator's guide. [ENC-008963] Association for Supervision and Curriculum Development, toll-free: (800) 933-2723

Unlocking the Will to Learn
This book presents and explains the Learning Combination Inventory (LCI), an instrument for collecting information about a student's combination of learning schemas and determining his or her natural way of doing the task of learning. It explains how both learners and teachers can use the Learning Combination process to unlock the will to learn and the will to teach. The goal is to provide a central focus and beginning point for introducing effective learner-centered instructional practices. Readers learn how to group students for maximal effect for cooperative learning, how to apply interactive learning in all subject areas, and how to use the Interactive Learning Model to facilitate integrated curriculum instruction. This process or inventory must have the learner at its center, look at the learner as a whole, provide insights into the learner's motivation, and capture the individual's pattern of learning styles. The book covers a range of topics from theoretical constructs to virtual make-and-take projects for classroom use. [ENC-006797] Corwin Press, Inc., telephone: (805) 499-9774.

Grades K–12

A Toolkit for Professional Developers: Alternative Assessment, with 1995 Addendum

1994/1995

Publisher

Northwest Regional Educational Laboratory (NWREL)
Document Reproduction Services
101 SW Main Street, Suite 500
Portland, OR 97204-3297
Toll-free: (800) 547-6339
Telephone: (503) 275-9519
Fax: (503) 275-0450

1 toolkit: **$38.85**
November 1995 Addendum: **$21.75**

Author

Regional Educational Laboratory Network
Program on Science and Mathematics
Alternative Assessment

Funding

United States Department of Education (ED);
Office of Educational Research and Improvement (OERI)

This professional development resource book is a compilation of activities and supporting materials developed as an alternative assessment resource. It is also designed to engage teachers in dialogue about changing the ways mathematics and science have traditionally been taught and assessed. The emphasis is on alternative means of assessment, such as short answer, essays, performances, oral presentations, demonstrations, and portfolios. The toolkit provides information on the basics of assessment and on the types of assessment being developed, illustrating the variations with examples. It also discusses the issues surrounding the development and use of alternative assessment and emphasizes the monitoring functions of alternative assessment as well as the instructional potential. The toolkit is intended to assist users in developing a vision of what alternative assessment should be and to provide professional development activities such as workshops and long term training that allow educators to construct their own understandings of the nature and role of alternative assessment. The activities model the mechanics of alternative assessments for teachers. For example, the activity entitled Is Less More? allows teachers to experience an integrated, interactive, standards-based mathematics and science lesson and to consider the implications of such a lesson for student assessment. In this activity, participants examine a box full of 50 sugar packets and are instructed to work cooperatively in designing and building a smaller container to hold those 50 packets. In addition to the design, the participants must record all measurements, show computations, compute the percentage reduction in paperboard as a result of producing the smaller box, and make sure that all members of the group understand the group's work well enough to explain it to others. Appendices include an alternative assessment sampler and a list of additional resources. The toolkit is currently being revised to include additional activities and sample assessments. The new version should be available early in 1998. (Author/DDD/LCT) [ENC-001664]

► Related Resources

ENC has other items in its collection related to alternative assessment:

Measuring What Counts: A Conceptual Guide for Mathematics Assessment
This book is meant for use by mathematics educators at all levels. It aims to advance the national discussion on assessment by establishing crucial research-based connections between standards and assessment. It demonstrates the importance of content, learning, and equity, three key principles for any program of assessment that is intended to support the national education goals. The message of the book is simple: assessment in support of standards must not only measure results, but must also contribute to the educational process itself. [ENC-007092] National Academy Press, toll-free: (800) 624-6242

Grades 9–12

Algebra in a Technological World

1995

Series: NCTM Addenda Series

Publisher

National Council of Teachers of Mathematics (NCTM)
1906 Association Drive
Reston, Virginia 20191-1593
Telephone: (703) 620-9840
Fax: (703) 476-2970
URL: <http://www.nctm.org>

1 text: Order #: 467 **$15.00**

Author

M. Kathleen Heid with Jonathan Choate, Charlene Sheets, Rose Mary Zbiek

Standards

NCTM Standards (1989). Content Standards: Grades 9-12; Algebra; Evaluation Standards: Student assessment.

This book, intended for classroom teachers as well as supervisors, curriculum developers, and teacher educators, addresses the teaching and learning of high school algebra in light of the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989). Also taken into consideration is the dramatic influence of graphing calculators and computer software on mathematics instruction. More than 18 classroom-tested activities shift students and teachers away from paper and pencil exercises towards using algebraic functions and mathematical modeling to explore real-world situations. The first section includes an overview of how graphing calculators and computer algebra systems help students explore, describe, and explain quantitative relations in their world. The next section explores how the new methods and technologies interact to support new curricular goals. Chapters three and four elaborate a modeling and functions approach to algebra. Connections between algebra, geometry, and discrete mathematics are discussed in chapter five, and the final chapter clarifies symbol sense, symbolic manipulation, and symbolic reasoning in a technological world. Most of the activities include reproducible blackline masters, as well as margin notes that provide teaching suggestions, assessment strategies, and ideas for lesson extensions. Solutions are provided. This book is part of the NCTM Addenda Series, intended to clarify and illustrate the implementation of the NCTM Standards. (Author/DDD) [ENC-002691]

► Related Resources

ENC has other resources in its collection related to algebra instruction:

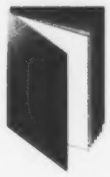
Routes to, Roots of Algebra
This book, for teachers of grades 5–8, explores the complexities of beginning algebra, the conceptual difficulties of later work, and ways to teach algebra. The authors try to identify the purpose and nature of algebra, looking at the general ideas behind algebraic thinking. [ENC-007219] Australian Association of Mathematics Teachers, Inc. (AAMT), telephone: 08-363-0288

Algebra for Everyone
This videotape and accompanying booklet provide teachers with models of instruction in algebra appropriate for students at all academic levels. The models incorporate the use of manipulatives in the development of algebraic concepts, cooperative groups, and the use of graphing calculators in problem solving. The video shows excerpts of lessons taught by a mathematics teacher in an ordinary classroom and is designed to serve as a catalyst for discussion on needed changes in instructional methods. [ENC-000001] National Council of Teachers of Mathematics, toll-free: (800) 235-7566

Grades K–12

Assessing Hands-on Science: A Teacher's Guide to Performance Assessment

1996



Publisher

Corwin Press Inc.
2455 Teller Road
Thousand Oaks, CA 91320-2218
Telephone: (805) 499-9774 or 0721
Fax: (805) 499-0871
E-mail: order@corwin.sagepub.com

1 text: ISBN: 0-8039-6443-9; Order #: 80038
$25.00

Author

Janet Harley Brown, Richard J. Shavelson

This book, developed for elementary and middle school teachers, discusses how to use performance assessments to measure student learning in a hands-on curriculum. The book opens with a discussion of the rationale for performance assessments, then provides reflective exercises to help teachers determine the kinds of assessments appropriate for their classrooms. Additional chapters provide examples of how traditional and performance assessments would approach the same material. Also discussed are the components and characteristics of performance assessments, and analytic versus holistic scoring systems. The authors provide samples of completed score forms and models of embedded assessments, as well as hints for choosing reliable, valid, and practical assessments. One exercise requires teachers to choose the most appropriate assessment for a particular learning experience. Additional resources and bibliographic references are provided. (Author/LCT) [ENC-007457]

Related Resources

ENC has other items in its collection related to performance assessment:

Performance Assessment in the Science Classroom
This book, developed for middle school teachers, identifies 45 performance tasks that students use while completing science education assignments. The tasks are designed to assess process skills, graphing and data analysis, communication, and the organization of science content. Other sections provide criteria for judging science products such as lab reports, models, and science fair displays. Also given are criteria for evaluating communication products such as pamphlets, oral presentations, slide shows, photo essays, and videos. The book provides checklists that divide each task into a series of detailed steps. The checklists are intended to facilitate evaluation of the methods used in completing the tasks and to improve the quality of the final products. Rubrics for each task follow its checklist. [ENC-008827] Glencoe/McGraw-Hill, toll-free: (800) 334-7344

How to Assess Student Performance in Science: Going Beyond Multiple Choice Tests
The purpose of this manual is to encourage discussions among science teachers about desired student outcomes in science and assessments appropriate to those outcomes. This publication is designed to help teachers consider a variety of possible student outcomes in science and to reflect on and choose appropriate ways to assess students' performance. Other goals are to assist teachers in developing appropriate criteria for judging students' work, encourage reflection on grading practices, and provide suggestions for getting schools and teachers started in changing practices. [ENC-002833] SERVE, toll-free: (800) 352-6001

Assessment in Elementary School Science
This document, developed by The National Center for Improving Science Education (NCISE) for elementary school teachers, discusses topics associated with assessment such as why it is important, how and what to assess, and how it can be used as instruction. The NCISE mission is to promote changes in state and local policies in science curriculum, science teaching, and the assessment of student learning in science. The emphasis of this document is on using assessment to enhance, not undermine, instruction. [ENC-003540] The NETWORK, toll-free: (800) 877-5400

Grades K–5

Beyond Arithmetic: Changing Mathematics in the Elementary Classroom

1995

Publisher

Dale Seymour Publications
PO Box 5026
10 Bank Street
White Plains, NY
Toll-free: (800) 872-1100
Fax: (914) 328-5487
URL: <http://www.aw.com/dsp>

1 text: ISBN: 0-86651-846-0; Order #: ENC701-21259 **$13.95**

Author

Jan Mokros, Susan Jo Russell, Karen Economopoulos

Standards

NCTM Standards (1989). Content Standards: Grades K–4; Number sense and numeration; Content Standards: Grades 5–8; Number systems and number theory

NCTM Standards (1991).

Funding

National Science Foundation (NSF)

This book discusses why the National Council of Teachers of Mathematics (NCTM) called for reform in mathematics teaching, resulting in *Professional Standards for Teaching Mathematics* (1991). It also offers practical suggestions for educators. The book describes and illustrates the reform's goals as they are reflected in curriculum materials, in assessment, and in the everyday workings of the mathematics classroom. Beginning with an inquiry into the need for change, the book offers a philosophical framework linking the NCTM goals to what actually happens in classrooms. For example, the authors note that shifting our emphasis to problem solving and reasoning requires a focus on getting students to think, explain, justify, and demonstrate. After examining the role of curriculum and considering how it needs to be redefined as a tool for both teacher and student learning, the book presents a glimpse of how young students look and sound when they are thinking and reasoning mathematically. Remaining chapters address questions teachers commonly ask about mathematics reform, describe approaches to assessing mathematical understanding, and discuss issues teachers face when creating a climate in which students are active mathematical learners. (Author/LDR) [ENC-004715]

► Related Resources

ENC has other resources in its collection related to the teaching of arithmetic:

Fractions, Decimals, Ratios, and Percents: Hard to Teach and Hard to Learn?
This collection of short mathematics teaching cases, written by and for teachers of grades 4–8, is intended to stimulate discussion and collaborative reflection, so as to prompt improvement in curriculum and instruction specific to fractions, decimals, ratios, and percents. The accompanying facilitator's discussion guide contains suggestions for structuring a teacher study group, as well as a series of questions and issues raised by each of the cases. Issues include the differences between conceptual understanding and procedural knowledge, the colloquial use of 100%, and the possibility that curriculum materials reinforce the idea that 100% is 100. [ENC-009003] Heinemann Educational Books, Inc., toll-free: (800) 541-2086

Grades 9–12

Doing Science: Innovative Curriculum for the Life Sciences

1996

Publisher

Corwin Press Inc.
2455 Teller Road
Thousand Oaks, CA 91320-2218
Telephone: (805) 499-9774 or 0721
Fax: (805) 499-0871
E-mail: order@corwin.sagepub.com

1 text: ISBN: 0-8039-6477-3; Order #: D6843-6477-3 **$19.95**

Author

Neal A. Glasgow

This book provides science teachers with innovative ways of getting students to work on real-world problems and projects. This problem-based, student-centered approach to science education focuses on life science learning and includes lessons from biology, chemistry, and physics. The text includes practical guidance for turning students into active participants in instruction by tapping into their natural curiosity, concern, and creativity. Teachers are given tips for developing activities and assessing their outcomes, as well as teaching students about collecting and analyzing data to find solutions to problems. Other guidance addresses how to recruit and incorporate community mentors into student projects. In a sample problem, the Green Photosynthetic People Project, a laboratory accident has caused several graduate students to absorb plant DNA into their own genomes, and students are asked to write a series of newspaper articles explaining the biological mechanisms of the resulting changes. Article topics may incorporate biotechnology, genetics, human ecology, and molecular biology. Other topics could be photosynthesis, organic chemistry, the physics of light, surface to volume ratios, and ethics. Also included are examples of real science projects that take students into university laboratories to develop their own queries. A sample investigation involves determining if bees are more attracted to yellow flowers than to blue ones. In addition, the book provides outlines for student portfolios, addresses issues of liability, and includes sample policies and release and permission forms. (Author/LCT) [ENC-004641]

► *Related Resources*

ENC has a variety of resources in its collection that can be used to help teachers implement discovery-based, practical science instruction in their classrooms:

Doing What Scientists Do: Children Learn to Investigate Their World
This book, written for elementary teachers and administrators, translates the theory of discovery learning into practical classroom methods. The book begins with a discussion about the nature of science and how children learn by constructing knowledge. Subsequent chapters show how to inspire students' curiosity, how to organize space and materials, and how to manage the classroom in a way that encourages focus and interest. Also described is how to deal with the differing needs of individual children and teachers. The book answers frequently asked questions about evaluation, grading, standards, and required textbooks. Included are sample dialogues between teachers and between teachers and students. Samples of student worksheets are also provided. The book includes a bibliography and reproducible student worksheets. [ENC-004640] Heinemann Educational Books, Inc., toll-free: (800) 541-2086

Grades K–5

Double-Column Addition: A Teacher Uses Piaget's Theory

1989

Publisher

Teachers College Press
Orders
PO Box 20
Williston, VT 05495-0020
Toll-free: (800) 575-6566
Fax: (802) 864-7626
E-mail: tcpress@www.tc.columbia.edu
URL: <http://www.tc.columbia.edu/~tcpress/>

1 videotape: ISBN: 0-8077-3009-2 **$55.00**

Author

Developed and narrated by Constance Kamii; produced by Mel Knight

This video, one in a series that documents a program for teaching primary mathematics, captures the responses and thought processes of second graders as they work with double-column addition. Based on the developmental theory of Jean Piaget, this program opposes the traditional assumption that math is subject matter to be learned by memorizing rules, completing individual exercises, and receiving feedback from the teacher. In contrast, this video models teaching techniques that are in line with Piaget's theory, which states that children learn by constructing concepts internally. The segments show that double-column addition is constructed, or invented, by each child through his or her own natural ability to think. The video also reveals that the development of this ability is strongly influenced by the social interaction among children. The children in this tape had never used textbooks, workbooks, or drills to learn math. Their previous math education consisted only of selected games, problem solving based on situations from daily living, and discussions like the ones documented on the video. (Author/KFR) [ENC-008911]

Related Resources

ENC has other items of this series in its collection:

Multidigit Division: Two Teachers Using Piaget's Theory
This video captures the responses of students in grades 2 and 3 as they work with multidigit division. First, viewers watch second graders reinvent the logic of division as they decide whether 66 crackers are enough for everybody in the class to get one each, then two each, and then three each. Next, four third graders explain four different ways of getting answers to multidigit division problems. The tape presents the differences and similarities between traditional conceptions of the algorithm and the children's ways of thinking. [ENC-008913]

Multiplication of Two-Digit Numbers: Two Teachers Using Piaget's Theory
In this video, second and third grade students are shown working with the multiplication of two-digit numbers. Students in grade 2 invent six different ways of getting the answer to 5x55. Next, three third graders explain three different ways of getting the answer to 5x33. Class discussion consists principally of the children's explanations of how they arrived at their answers. The video reveals that, while the third graders' responses are similar to those of the second graders, the third graders' development in the direction of adult algorithms is clear. [ENC-008915]

Grades PreK–10

GEMS Teachers Handbook

1993 *Series: GEMS*

Publisher

University of California, Berkeley
GEMS, Lawrence Hall of Science, No. 5200
Berkeley, CA 94720-5200
Telephone: (510) 642-7771
Fax: (510) 643-0309
URL: <http://www.lhs.berkeley.edu>

1 text: ISBN: 0-912511-72-9 **$9.00**

Author

Revised by Jacqueline Barber, Lincoln Bergman, Kimi Hosoume, Cary Sneider, and Carolyn Willard

Evaluation Information

This resource was reviewed for and included in the 1996 publication *Resources for Teaching Elementary School Science* [ENC-001371], a listing of effective hands-on, inquiry-based curriculum materials for grades K–6.

This handbook, part of the *Great Explorations in Math and Science (GEMS)* series, provides educators with special tips that apply to teaching GEMS and other guided discovery science and mathematics activities. GEMS is a series of thematic units for grades preK–10 that help students master mathematics and science content and process skills. This handbook, designed to be distributed to teachers by GEMS leaders, discusses questioning strategies, ways of evaluating student performance, and methods for integrating activities with established curricula. Educators are given strategies for obtaining materials and guidance on what to do when students get the wrong answer. Also available are a leader's handbook, parent's guide, and the GEMS guide to children's literature. (Author/DEB/LCT) [ENC-004802]

Grades PreK–10

The Architecture of Reform: GEMS Meets the National Standards

1997 *Series: GEMS*

Publisher

[Same as Above]

1 text: ISBN: 0-912511-43-5 **$9.00**

Author

Cary I. Sneider, with Jacqueline Barber and Lincoln Bergman

Standards

National Science Education Standards (NSES) (December 1995); Science for All Americans (1989); Benchmarks for Science Literacy (1993); Scope, Sequence and Coordination (SS&C) Project; Project 2061 (1985)

Funding

Apple Computer, Inc.; A.W. Mellon Foundation; Carnegie Corporation; Chevron USA; Hewlett Packard Company Foundation; McDonnell Douglas Foundation; National Science Foundation (NSF)

This handbook is designed to help teachers and administrators plan and implement science curriculum. It is intended to be a road map to help them understand and use the reform documents to improve their own science education programs. The book is organized into three parts. Part I puts current reform initiatives, such as Project 2061, Benchmarks for Science Literacy (1993), and the National Science Education Standards (1996) into a historical perspective and describes the unique role of each of these documents. It also discusses the common vision of the science education reform programs and presents the central GEMS metaphor of building a "House of Science." Part II relates the vision and goals of the key reform documents to the GEMS series, describing how GEMS supports the goals of the new reforms and how sequences of the GEMS units can be used in hands-on, minds-on programs. The appendices provide additional details about some of the issues discussed in the text. Appendix A compares what each of the three major reform programs have to say about ideas central to the current reform movement. Appendix B defines 10 unifying concepts and processes that help students connect different disciplines and topics in science. Appendix C summarizes different aspects of the nature of science that are featured in GEMS Guides, and Appendix D includes transparency masters. (Author/LCT) [ENC-009484]

Grades 5–10

Learning in Science: The Implications of Children's Science

1985

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

1 text: ISBN: 0-86863-275-9; Order #: 57260
$23.00

Author

Roger Osborne and Peter Freyberg, with Beverley Bell, Ross Tasker, Mark Cosgrove, and Brendan Schollum

This book is designed to illustrate that children come to school with views of the world and meanings for words that have a significant impact on their learning of science-related subjects. The book explores recent findings from a range of studies on child learning and analyzes the impact of these findings on the teaching and learning process. The authors also suggest both general and specific solutions to problems that are identified for the learner and teacher. Topics include how children construct knowledge about the world from everyday events and how these ideas interact with those introduced by the teacher in science lessons. Discussions center around the use of activity-based lessons in science classrooms, and various teaching models are explored. Also examined are the implications of current educational research on curriculum and teacher education. Appendices contain teacher interview checklists, a student survey of related science topics, a pupil evaluation checklist for science activities, and a checklist for planning student activities. (Author/CCM) [ENC-007765]

► Related Resources

ENC has other resources in its collection related to teaching primary science:

Primary Science, Taking the Plunge: How to Teach Primary Science More Effectively
This book deals with features of science instruction that commonly cause concern to many primary teachers. Topics include helping children make a start in primary school science, handling student questions, and encouraging children to record their work. Other issues address helping students ask questions, observe, plan investigations, and communicate. Teachers are encouraged to take children's own ideas into account. [ENC-007764] Heinemann Educational Books, Inc., toll-free: (800) 541-2086

Early Childhood and Science: A Collection of Articles Reprinted from Science and Children
This book, developed for grades preK–2, is a collection of articles from *Science and Children*, the preschool through middle school journal of the National Science Teacher's Association (NSTA). The book offers concrete suggestions for integrating science skills of observation, identification, and exploration with traditional activities in art, music, and literature. Special topics include working with parents and volunteers, teaching weather and seasonal change, and working with gifted children and slow learners. Sample activities include constructing an earthworm farm, using the voice and piano to teach the concepts of pitch and loudness, and a cloud watch to reinforce the concept of wind moving clouds. [ENC-003326] National Science Teachers Association (NSTA), toll-free: (800) 722-6782

Grades 5–8

Managing Technology in the Middle School Classroom

1996

Series: TechKNOWLEDGEy

Publisher

Teacher Created Materials, Inc.
Orders
6421 Industry Way
Westminster, CA 92683
Toll-free: (800) 662-4321
Fax: (800) 525-1254
URL: <http://www.teachercreated.com>

1 text with CD-ROM: ISBN: 1-55734-667-4;
Order #: TCM667; **$21.95**

Author

Paul Gardner; illustrator, Howard Chaney; editor, Dorinda Mas

System Requirements

Macintosh: 256 color capability; sound card; CD-ROM drive
Windows: Windows 3.1 or higher; 256 colors, QuickTime for Windows (2.0 or higher).
HyperStudio also supports laserdisc players.

This book and accompanying CD-ROM, part of the TechKNOWLEDGEy series, provides teachers with directions for managing and using equipment in the classroom. Also included are guidelines for integrating technology with existing curricula. The series is intended to help teachers learn and use the fundamentals of computer technology. In this book, one section explains the hardware components most commonly found in the classroom: the computer, the printer, the monitor, the keyboard, and the mouse. Information is also provided on Random Access Memory (RAM), Disk Operating System (DOS), Windows, and the differences between the Macintosh and IBM and its compatibles. The Software Section explores technology tools used by teachers to deliver curricula. The five major divisions within this section are Electronic Learning and Research, Data Analysis, Writing and Publishing, Presentation and Creativity, and Telecommunications. A detailed description of each technology tool is provided, along with a justification for using it, strategies for teaching the software, and recommendations for hardware and software. The Management Section outlines several management challenges and provides management tools and techniques to deal with common problems such as one-computer classrooms and outdated equipment. Lesson plans that utilize technology tools are included. The Appendix includes a glossary of terms, a bibliography, and listings of suggested software and of resources for writing grants. The CD-ROM included with this book is a fully functional version of HyperStudio designed to introduce teachers to the software. Users may complete a tutorial, view sample projects, click on Step-by-Step for a lesson on how to complete their first project, and visit the Media Library to find hundreds of images and sounds to use in their productions and presentations. (Author/FEB) [ENC-008901]

► *Related Resources*

ENC has other items of the TechKNOWLEDGEy Series in its collection:

Integrating Technology into the Curriculum: Primary
This book offers teachers of grades K–3 sample lesson plans designed to help integrate technology into all areas of the curriculum, including language arts, math, social studies, art, and science. In one plan, the students use animal reference software—such as Zoo Keeper—and productivity software—such as Kidpix or Storybook Weaver—to create an environment for a zoo animal and to write a story about the animal. The lesson plans include planning sheets, assessment forms, and, when available, listings of relevant Web sites. [ENC-008905]

Grades K–8

Math Makes Sense: Teaching and Learning in Context

1994

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

I text: ISBN: 0-435-08362-7; Order #: 08362
$23.00

Author

Rachel Griffiths and Margaret Clyne

The intent of this book is to show teachers how classroom mathematics can be more than just the manipulation of numbers and symbols. The book provides an example of how teaching and learning can work, presenting the view that mathematics is a powerful tool with which children can describe their world and solve problems. It demonstrates that all children can acquire the skills and confidence to apply their mathematical learning in a variety of practical situations. In support of these theories, the authors provide illustrative case studies, strategies for teaching, and numerous activities for students. The wide selection of activities is not sequenced in a particular presentation order. Rather, different activities are geared towards many different age groups. For example, one activity asks children ages 5–8 to read poetry to develop concepts such as shapes, numbers, and space. In another, parents of students reflect on math in their own lives to help them understand mathematical processes and their children's viewpoints. The book provides blackline masters for lessons as needed. (Author/KFR) [ENC-006414]

► *Related Resources*

ENC also has the following resources available from Heinemann Educational Books, Inc.:

Twice Five Plus the Wings of a Bird
This video bridges educational theory and classroom practice by interspersing interviews with American and British psychologists and mathematics researchers with those of children being questioned about their understanding of basic arithmetic facts. The philosophy is that students are capable of inventing their own methods for finding solutions to problems, and that by learning in this manner, they have greater interest in and retention of mathematical concepts. The video's main emphasis is on how, what, and why children learn arithmetic principles. Taped footage of actual classrooms demonstrates how children invent algorithms as they solve problems. [ENC-008517]

Mathematics in the Making: Authoring Ideas in Primary Classrooms
This book, intended for teachers of grades K–4, explores the relationship of reading, writing, and mathematics by describing actual experiences and conversations of a mathematics teacher with students. The teacher worked in three classrooms: an at-risk grade 1, a standard grade 2, and a standard grade 3. The book shows that, with literature as the starting point, students learn the value of conversation, the benefit of learning from each other, and the essential role of the teacher. This model emphasizes the complementary nature of curriculum and evaluation, the importance of basing evaluation and curricular decisions on an understanding of concepts and strategies, and the need for teachers to evaluate the curriculum as well as students. [ENC-007771]

Grades 6–8

Mathematics for Middle School, Part 1

1989

Series: Mathematics for Middle School

Publisher

Cuisenaire Company of America, Inc.
10 Bank Street, PO Box 5026
White Plains, NY 10602-5026
Telephone: (914) 997-2600
Toll-free: (800) 237-3142
Fax: (914) 997-2192
E-mail: info@cuisenaire.com
URL: <http://www.cuisenaire.com>

1 videotape: Order #: EN701-070395 **$89.00**
1 series: Order #: EN501-070397 **$225.00**
Note: The series includes parts 1, 2, and 3 of *Mathematics for Middle School.*

Author

Developed by Marilyn Burns; executive producer, Lonnie Barbach; director/writer, Deborah Shames

This video and accompanying discussion guide, Part 1 of the *Mathematics for Middle School* series, focus on the importance of incorporating student communication (verbal and written) about mathematics into all classroom lessons. Designed as a resource for planning and developing inservice workshops for middle school teachers, the series is composed of three 20-minute videos of lessons taught to sixth, seventh, and eighth grade classes. Lesson topics include fractions and percents, ratio and proportion, area and perimeter, and probability and statistics. Each tape in the series focuses on a specific aspect of mathematics instruction, such as giving students problems to solve that engage them in mathematical reasoning. Other aspects of mathematical instruction modeled by the series include encouraging students to explain their thinking both verbally and in writing, whether in small cooperative groups, whole class discussions, or individually. Similarly, the tapes show students using manipulative materials to help develop understanding; their errors and misconceptions are accepted as natural to the process of learning. Mathematical topics and concepts are shown being integrated and taught in a variety of ways, embedded as much as possible in contextual settings. In the series, teachers see models of how to introduce new topics in a problem-solving context, make effective use of calculators, and use homework as a tool for extending understanding. Also included are interviews showing students' reactions to their math learning. The discussion guide provides a suggested timeline and lessons plans for the inservice session, as well as an overview of the series and its goals. (Author/GMM) [ENC-005706]

Related Resources

ENC has two other items in this series: *Mathematics for Middle School, Part 2* [ENC-005707] and *Mathematics for Middle School, Part 3* [ENC-005708]

Part 2 (*The Role of the Teacher*) focuses on how teachers can set up problem situations, get students to work cooperatively in small groups, respond to students, and give homework assignments to further their learning. Part 3 (*The Role of the Content*) focuses on how to approach mathematics concepts in a variety of ways and how to integrate different areas of the mathematics curriculum.

The resources on this page both deal with the theme of "Teaching in Context."

Grades PreK–6

Mathematics with Reason: The Emergent Approach to Primary Maths

1992

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

1 text: ISBN: 0-435-08333-3; Order #: 08333
$23.00

Author

Edited by Sue Atkinson

Standards

NCTM Standards (1989)

This book explores how elementary mathematics teachers can make their teaching more effective both at home and at school. A particular emphasis is placed on implementing the *Curriculum and Evaluation Standards for School Mathematics* (1989) from the National Council of Teachers of Mathematics. The first section discusses theory, covering issues such as problem solving, standard notation, graphing, and children's intuitive methods. The second section features real-life stories of several teachers who are implementing the theories in their classrooms. This section provides helpful headings for each of its chapters that indicate situations, themes, and age group. In the third section, the focus is on the practicalities of adopting the emergent approach and the different ways to move forward. The discussion revolves around topics such as teacher organization and confidence. The ideas in the book come from teaching and advisory work, from research, and from discussions with groups of teachers and parents. (Author/KFR) [ENC-007763]

Grades K–7

Science with Reason

1996

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

1 text: ISBN: 0-435-08381-3 **$19.50**

Author

Edited by Sue Atkinson and Marilyn Fleer

This book advocates the concept of "learning science with reason," which proposes that young children learn science through participation in purposeful activity. Further, the authors claim that this purposeful activity must emphasize the role of language in conceptual development. The book presents a holistic approach to science learning and offers many positive teaching experiences. Recent pedagogical developments in science are addressed, as are real-life stories of teachers integrating topics such as scientific investigations, materials, and their properties and physical processes. The stories give a picture of what science learning can look like for a wide range of topics and provide practical ideas for studying each topic. The first section discusses the importance of children's intuitive ideas in science learning. Other sections focus on the different ways teachers can encourage students to talk and question what they do. A wide variety of stories, loosely organized by grade level, demonstrate a number of crucial aspects of teaching science. Topics covered include use of the background theory, discovery approach, process approach, transmission approach, and interactive approach in teaching and learning science. Also discussed are views on the richness of early learning, the ways that children learn, and the role of inquiry-based discussion groups in science. The book contains information on how to write a primary science policy and information on assessment and achievement. (Author/CCM) [ENC-007701]

Grades K–6

Mathematics: Teaching for Understanding (K to 6)

1992

Publisher

Cuisenaire Company of America, Inc.
10 Bank Street, PO Box 5026
White Plains, N.Y. 10602-5026
Telephone: (914) 997-2600
Toll-free: (800) 237-3142
Fax: (914) 997-2192
E-mail: info@cuisenaire.com
URL: <http://www.cuisenaire.com>

1 set: Order #: EN701-070428 **$225.00**
Note: Set contains 3 videotapes (Parts 1–3) and teacher guide.

Author

Developed by Marilyn Burns; producer, Lori Wright; director, Deborah Shames

Standards

NCTM Standards (1989).

This set of three videos and a discussion guide is a resource for planning and delivering workshops for K–6 school teachers interested in implementing the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989). The videos provide examples of mathematics instruction in which students engage in problem-solving activities, work cooperatively in small groups, and utilize manipulative materials to help develop understanding. Students are also shown writing about their learning and communicating their ideas in whole class discussions. Part One of the series shows teacher-directed whole class lessons, while Part Two features small groups of students working independently on a variety of activities. Part Three demonstrates how verbal and written communication in math lessons supports students' learning and aids teachers' assessment of students' understanding. The discussion guide gives background information about the videos, describes the lessons shown, and provides questions for discussion. The guide also gives detailed descriptions of the mathematics activities on the tapes, along with samples of student work and blackline masters of all worksheets used in the lessons. Included are suggested directions for workshop planning and implementation. (Author/GMM) [ENC-005709]

Related Resources

ENC has other resources related to implementing standards in mathematics instruction:

Mathematics Curriculum and Teaching Program Professional Development Package
This K–10 mathematics curriculum resource, based on classroom activities developed and used in Australia, is a collaborative program with computer software, videos, and printed curriculum materials. Specific themes include the effective use of technology, the potential benefits of cooperative group work, and ways of ensuring that school mathematics has a greater sense of relevance and purpose. The two print volumes feature classroom activities that cover a wide variety of topics, such as probability, estimation, geometry, problem solving, number properties, and visual imagery. Also provided is a chart that delineates the recommended age levels of the activities and major mathematical topics. Software and videotapes are included for use in some of the activities. The software is used to check answers, produce tables, and generate data for analysis. [ENC-000843] National Council of Teachers of Mathematics, toll-free: (800) 235-7566

Grades 3–7

The Multicultural Math Classroom: Bringing in the World

1996

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

I text: ISBN 0-435-08373-2 **$25.00**

Author

Claudia Zaslavsky

Standards

NCTM Standards (1989): Evaluation Standards: Student assessment. Content Standards: Grades K–4. Mathematical connections; Mathematics as communication; Mathematics as problem solving; Mathematics as reasoning. Content Standards: Grades 5–8. Mathematical connections; Mathematics as communication; Mathematics as problem solving; Mathematics as reasoning

This teacher resource book includes eight lessons that introduce a multicultural perspective to the elementary and middle school mathematics curriculum. It begins with a rationale for multicultural mathematics education, then describes how educators are bringing multicultural perspectives into their classrooms. The lessons provide background information with references, along with suggestions for cooperative learning activities and open-ended projects that encourage creativity and critical thinking. One lesson teaches children about how numbers are used in trading within a variety of cultures, including West Africa, China, and Egypt. After learning about various systems of exchange, such as the use of wampum by the Iroquois and the use of cocoa beans by the Aztecs, students might pretend they live in a culture that uses cowrie shells or beads for currency. This cooperative learning activity can be extended to include long-range projects such as setting up a model marketplace, researching forms of money used around the world, and investigating foreign exchange columns in daily news publications. (Author/CMS) [ENC-008965]

Related Resources

ENC has other items in its collection related to this theme:

Every Child, Every School: Success for All
This book, intended for preK–6 educators, discusses the Success for All Program, which advocates shifting schools' emphasis from remediation to prevention and early intervention. Prevention includes providing excellent preK and K programs and improving curriculum, instruction, and classroom management. [ENC-006796] Corwin Press, Inc., telephone: (805) 499-9774

How to Encourage Girls in Math and Science: Strategies for Parents and Educators
Designed for parents and educators of grades K–8, this book examines effects of sex role socialization on girls' achievement in math and science. The book presents several educational strategies and 69 activities to develop girls' skills, confidence, and interest in math and science. [ENC-001298] Dale Seymour Publications, toll-free: (800) 872-1100

Grades 9–12

NSTA Pathways to the Science Standards

1996

Publisher

National Science Teachers Association (NSTA)
1840 Wilson Boulevard
Arlington, VA 22201-3000
Toll-free: (800) 722-6782
Fax: (703) 522-6091
URL: <http//www.nsta.org>

1 text: ISBN: 0-87355-144-3; Order #: PB126X
$24.95

Author

Edited by Juliana Texley and Ann Wild

This book, developed for high school science teachers by the National Science Teachers Association (NSTA), contains suggestions for implementing the *National Science Education Standards* (NSES) into the classroom. The first three chapters discuss the teaching, professional development, and content standards that apply to all K–12 teachers, but the examples provided are specific to high school teachers. Each chapter features a list of the standards and a chart highlighting the shifts in emphasis envisioned by them, as well as practical discussions about each standard and a bibliography of relevant articles. The fourth chapter covers the science content outlined in the NSES for students in grades 9–12. The Content Standards have been clustered into three sections: physical science, life science, and Earth and space science. For each discipline, the book includes examples of inquiry, science and technology, personal and social perspectives, and history and the nature of science, integrating them within the disciplines rather than devoting separate sections to them. The text also contains vignettes from exemplary programs. The last two chapters discuss national standards for the science program and the educational system.
A brief history and an outline of the NSES are provided in the appendices. (Author/LCT) [ENC-004853]

Related Resources

Also available from NSTA:

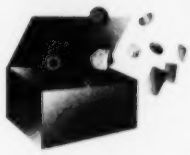
Scope, Sequence, and Coordination: A Framework for High School Science Education
This 1996 edition is a revision of the 1995 National Science Teachers Association (NSTA) publication, *A High School Framework for National Science Education Standards*. Building on the success of the NSTA initiated project for middle school, Scope, Sequence, and Coordination of Secondary School Science (SS&C), this publication is intended as a guide for implementing SS&C at the high school level. The purpose of this edition is to further clarify the topics addressed by the new National Science Education Standards (NSES) and to show how science in the four subject areas—physics, chemistry, biology, and Earth and space science—can be sequenced, integrated, and coordinated over four years of high school. Part One consists of sections on physics, chemistry, biology, and Earth and space sciences; within each discipline are listed the topics that comprise the standards. Each topic is followed by detailed explanations, related concepts, empirical laws or observed relationships, models and theories, and a learning sequence. Part Two consists of the five other components of the National Science Education Standards that complete the content standards for grades 9–12. Also included is a series of micro units that correspond to the learning sequence proposed in this book. The micro units, which consist of lab activities, supplemented by questions, problems, and readings, are available free on the Internet. In addition, the text provides a glossary and an appendix listing the SS&C tenets. [ENC-008516]

Issues in Science Education
This book, designed for educators of grades K–12, consists of a collection of essays by teachers, administrators, and other experts in science education research and reform. The book is divided into seven sections. Section one sets the stage by examining the issues associated with science education reform. Section two illustrates how technology can be incorporated into the curriculum and how the use of technology promotes student learning. Section three discusses the importance of basing curriculum and teaching decisions on research findings. Section four examines alternative methods of assessment required to evaluate the growing variety of activities that engage science students. Sections five and six deal with issues that affect the day-to-day work of curriculum developers, instructional leaders, and science teachers. Section seven addresses general issues and perspectives related to professional development. [ENC-008524]

Grades K–12

Talking Mathematics: Resource Package for Staff Developers

1996



Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

1 package (7 videotapes, 2 books):
ISBN: 0-435-08398-8; Order #: 08398 **$450.00**

Author

Produced and photographed by David A. Smith; resource books by Rebecca B. Corwin, Sabra L. Price, and Judith Storeygard

Standards

NCTM Standards (1989). Content standards: Grades K–4, 5–8

NCTM Standards (1991). Professional standards: Standards for teaching mathematics: Student's role in discourse; Teacher's role in discourse; Tools for enhancing discourse

Funding

National Science Foundation (NSF)

This professional development resource package, designed to provide starting points for teachers to learn about mathematical discourse and its role in the elementary classroom, consists of seven videotapes and two resource books. The video entitled *A Teacher Seminar* illustrates aspects of the facilitator's role in maintaining mathematical discourse. Inservice teachers are shown working on two problems intended to stimulate mathematical discourse. They then reflect on how such discourse affected their own mathematical understandings. The next video, *Supporting Classroom Discourse*, discusses the need for student discourse in mathematics and gives examples of questions that encourage mathematical discourse. The other tapes feature K–6 students communicating via mathematical talk, posing questions, taking risks, and pursuing their own investigations. The video *Classroom Episodes* records the mathematical discourse of students as they discover geometric and number patterns. Another tape, *Definitions and Descriptions*, shows children constructing their own definitions by observing and describing objects. *Models and Representations* demonstrates how students use models to explain and justify answers, while *Sharing Strategies* provides examples of students sharing problem-solving strategies, demonstrating how those strategies influenced others. Finally, the seventh video, *Patterns and Predictions*, focuses on children's analytical processes and abilities to recognize patterns in repeated operations.

Complementing the videos, the book *Supporting Children's Voices* describes the need to adopt an exploratory and investigative perspective so that students learn to think about mathematical situations, pursue their own ideas, and develop effective strategies with regard to number, space, and data. This book also highlights the role of talk in children's mathematics and illustrates ways to challenge and support children as they work. The second book, *Resources for Developing Professionals*, helps seminar leaders develop a mathematical community where participants do mathematics, reflect on their own learning, and in turn reflect on aspects of pedagogy. Both books contain resource lists on mathematical talk, on teaching and learning issues, and on teaching and curriculum issues. Also provided are lists of suppliers of mathematical resources. (Author/LDR) [ENC-004718]

Grades K–6

The Mystery of the Moving Can: Problem Solving

1996

Series: Learning to See: Observing Children's Inquiry in Science

Publisher

Heinemann Educational Books, Inc.
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
URL: <http://www.heinemann.com>

1 video (includes sessions 1 & 2 and guides): **$110.00**

1 series (Videos 1–4, 4 participant's guides, 1 facilitator's guide): **$400.00**

Author

Produced by Education Development Center, Inc.; project director, Bernard Zubrowski; producer/director, David R. Nelson

Evaluation Information

Field tested: Massachusetts [Hosmer School; Concord Public Schools; Wheelock College, Boston; Lexington Public Schools; Boston University; Lynnfield Public Schools]; Vermont [Trinity College, Burlington]; Maine [York School District]; North Carolina [North Carolina Museum of Life and Science]; Oregon [Oregon Museum of Science and Industry].

Funding

National Science Foundation (NSF)

This series of videotapes and print materials was designed to help K–6 teachers understand the role of exploration in children's science learning. The project is based on the premise that effective teachers are skilled observers of children's behavior. Drawing on Bernie Zubrowski's work observing students in science museums and classrooms, the videos show the different ways in which students begin their explorations. Also illustrated are verbal and nonverbal communication during an exploration, social behavior with adults and other students, and assessment based on children's manipulation of materials and their spontaneous comments throughout the process. Each program is shown in real time, with no narration, and features a single pair of students. In this video, two fifth grade girls, Avery and Sheyda, blow bubbles on a table top using drinking straws and dishwashing soap solution. At one point, Avery blows a bubble on top of a large can, and the can starts moving across the table by itself for a distance of 12 to 16 inches. With Zubrowski's help, the girls verbalize what they think is happening and find variables for simple experiments. A participant's guide provides commentary from Zubrowski and other science educators, in addition to descriptions of the themes at play in that particular session. The facilitator's guide includes the project rationale, a brief description of inquiry science teaching, and suggestions for presenting the tapes. Also provided is a brief description of each episode and a framework for discussing and interpreting the children's behavior. (Author/LCT) [ENC-004445]

Related Resources

ENC has other volumes in this series in its collection, including:

The Mystery of the Bubbles that Wouldn't Move: Finding and Testing Variables
This session, also for K–6 educators, highlights a basic issue related to students' perception of their role in inquiry teaching. Two grade 6 girls, Aijuana and Hannah, blow bubbles on a tabletop using a drinking straw and dishwashing soap solution. Hannah blows on a small bubble dome, causing it to skim across the tabletop. After she does this, Zubrowski asks both girls to watch him blow bubbles across the table. A small bubble dome at one spot of the table moves easily some distance from its original location, but a bubble at another spot on the table does not move. The girls spend the next 25 minutes trying a variety of simple experiments to investigate factors that might affect the situation. A participant's guide and facilitator's guide are included. [ENC-004450]

Grades K–12

Strategies for Teaching Physical Science: Facilitator's Manual

1989

Series: Strategies for Teaching

Publisher

Texas Tech University
College of Education Box 41071
Lubbock, TX 79409-1071
Telephone: (806) 742-2371
Fax: (806) 742-2179

1 text: **$30.00**
Note: ENC also has the facilitator's manuals for *Strategies for Teaching Life Science* [ENC-004978] and *Strategies for Teaching Earth Science* [ENC-004979]

Author

Prepared by Gerald D. Skoog, Violetta Lien

Funding

Texas Education Agency (TEA); Science Section, Division of Curriculum Development

This physical science facilitator's guide contains seven resource units that cover topics such as the nature of matter, forces and motion, heat, electricity and magnetism, and light and sound. It is part of a series developed to provide physical science, life science, and Earth science teachers with the resources needed to improve their instruction. In this resource guide, each unit contains lessons and materials that emphasize information processing strategies of thinking, such as concept attainment, inductive thinking, inquiry training, and advance organizers. Also addressed are heuristic techniques for learning science concepts and vocabulary, including concept maps and Vee heuristics. The guide provides physical science demonstrations, problem-solving and decision-making strategies, and activities that let students relate their viewpoints and experience to the subject matter. Some units cover cooperative learning strategies and the effective use of lab activities and their correlation with the essential elements. Background information and suggestions are provided for the various methodologies. The lessons are provided as models for teachers to use in learning the rationale, theory, and procedure that are inherent to each strategy. Each lesson presents essential elements, a procedure, extensions, and blackline masters of the student handouts. A bibliography is also provided. Inservice videotapes are available that model, explain, or present the various methodologies presented in the facilitator's guide. (Author/DEB) [ENC-004977]

► *Related Resources*

ENC has other resources in its collection related to the teaching of physical science and chemistry:

Experiences in Cooperative Learning: A Collection for Chemistry Teachers
This booklet, developed for grade 6–12 chemistry teachers by the Institute for Chemical Education (ICE), is a collection of articles about cooperative learning. The goals of the booklet are to provide information about the basics of this technique for those who want to implement it, illustrate the many ways that people have integrated this technique into a variety of learning situations, and encourage creative thinking about the learning process and environment in chemistry classes. The booklet contains exercises that help students understand how they learn, activities that incorporate in-class writing, and mystery scenarios to engage students in qualitative analysis. Teachers receive guidance on how to organize group assessments and how to engage in cooperative lecturing with informal learning groups. Chemistry topics include acids and bases, the mole, organic compounds, and radioactive decay. Reproducible masters and bibliographic references are also provided. [ENC-005848] Institute for Chemical Education (ICE), telephone: (608) 262-3033

Grades 9–12

Thinking Through Mathematics: Fostering Inquiry and Communication in Mathematics Classrooms

1990

Series: Thinking Series

Publisher
College Board Publications
2 College Way
Forester Center, WV 25438
Toll-free: (800) 323-7155
Fax: (800) 525-5562

1 text: ISBN: 0-87447-541-4 **$12.00**
(plus $4.00 shipping/handling)

Author
Edward A. Silver, Jeremy Kilpatrick, Beth Schlesinger; editors, Dennie Palmer Wolf, Robert Orrill

Standards
NCTM Standards (1989)

This book proposes ways that teachers can use a problem-solving approach to connect thinking and mathematics. It is part of a series that was initiated by the College Board's Educational Equality Project, a ten-year effort to improve the quality of secondary education and to ensure equal access to college for all students. The series addresses teaching all students how to become competent thinkers, with the goal that thinking will become an essential objective of all classroom activities in all subject areas. Through discussion and example, the series demonstrates how teachers are modifying their classroom practice to encourage students to think. Each book draws on both cognitive research and actual classroom practice. This book begins with an explanation of the changing perspectives on what it means to learn and do mathematics. It then goes on to explore how these perspectives can be incorporated into the teaching of secondary mathematics. To encourage teachers to find, construct and invent their own activities, the authors use both new and familiar examples of problems or tasks. Sample problems are drawn not only from newspaper stories or everyday experience, but are also adapted from textbooks. Vignettes of actual teachers' experiences are used to illustrate how educators can modify their practice to incorporate thinking activities. Considerable emphasis is placed on changing the nature of discourse in the classroom, including encouraging students to make conjectures and to reflect upon, refine, discuss, and amend their conjectures. (Author/GMM) [ENC-007428]

Grades K–12

Inquiry and Learning: Realizing Science Standards in the Classroom

1996

Series: Thinking Series

Publisher
College Board Publications
2 College Way
Forester Center, WV 25438
Toll-free: (800) 323-7155
Fax: (800) 525-5562

1 text: ISBN: 0-87447-541-4 **$12.00**
(plus $4.00 shipping/handling)

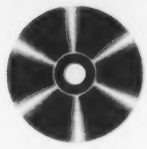
Author
John W. Layman with George Ochoa and Henry Heikkinen

This book is designed for teachers who want to implement science standards in their classrooms. Its goal is to help teachers realize the vision of science education that has emerged recently from the standards-setting efforts of the scientific community. Topics include thinking about science and science teaching, doing science, understanding science, and teaching science. Areas within the topics include using a variety of tools to explore the world of science and embedding standards in classroom practice. The book also provides new pedagogical constructs, information on inquiry based learning, and ways to assess student performance in experimental settings. Included is a lab report that describes an activity for students using cut potatoes. (Author/CCM) [ENC-007427]

Grades K–12

Understanding Teaching: Implementing the NCTM Professional Standards for Teaching Mathematics

1995



Publisher

Association for Supervision and Curriculum Development (ASCD)
Orders
1250 North Pitt Street
Alexandria, VA 22314-1453
Telephone: (703) 549-9110
Toll-free: (800) 933-2723
Fax: (703) 299-8631
URL: <http://www.ascd.org/>

1 CD-ROM package (4 discs): **$300.00**

Author

Developed by Technology Based Learning and Research, Arizona State University; Gary G. Bitter

Standards

NCTM Standards (1991). Professional standards: Standards for teaching mathematics. Worthwhile mathematical tasks. Teacher's role in discourse. Student's role in discourse. Tools for enhancing discourse. Learning environment. Analysis of teaching and learning.

Funding

National Science Foundation (NSF); IBM Corporation; Intel Corporation

Evaluation Information

New Media Invision, Silver Award, 1995

System Requirements

Windows: 486 DX/33 MHz; 8MB RAM; 8MB hard drive space; double-speed CD-ROM player; sound card; color monitor; Windows 3.1

This CD-ROM package is an interactive multimedia professional development seminar that uses hypertext, audio, animation, and full-motion video to help teachers recognize, understand, and explain the *Professional Standards for Teaching Mathematics* prescribed by the National Council of Teachers of Mathematics (NCTM). Participants can observe video vignettes that depict teachers instructing math in actual classroom settings. Users navigate within the program as would a student in a school: registering at the office, consulting an advisor, and moving between classrooms. The Professional Development module examines the NCTM *Teaching Standards* and subsequent supporting standards through video vignettes, accompanied by textual and audio explanations. The Teachable Moments module contains 17 video vignettes that can be used to practice identifying the *Teaching Standards*. In the Application module, learners create lesson plans based upon the four categories of the NCTM Teaching Standards: tasks, discourse, learning environment, and analysis of teaching and learning. In the Assessment module, teachers are presented with eight video vignettes and asked to identify the related *Teaching Standards* and write an explanation in the notebook provided. This program can be used onsite or implemented in professional development workshops. (Author/MPN) [ENC-006121]

► *Related Resources*

ENC has many other items appropriate to professional development workshops:

Learning about Teaching: An Interactive Tutorial Program to Facilitate the Study of Teaching
This interactive CD-ROM program and accompanying book are intended to provoke learning about teaching by encouraging teachers to reflect on teaching processes. The focus is on mathematics education, but these materials can be used in all areas of specialization to support and develop classroom observation and analysis skills, as well as to prompt discussions on acceptable and problematic features of classroom interactions. This CD-ROM program includes both an intense study of one mathematics lesson and an analysis of six components of quality teaching: building understanding, communicating, engaging, problem solving, nurturing, and organizing for learning. A video presentation of the entire lesson is included, and users can examine specific aspects of the lesson. A videotaped interview with the teacher and clips of individual students' contributions to the lesson are also provided. The program can be used in small or large group settings and requires at least 20 hours for completion. [ENC-009004] Australian Association of Mathematics Teachers, Inc. (AAMT), telephone: 08-363-0288

Grade 1

Young Children Reinvent Arithmetic: Implications of Piaget's Theory

1985

Series: Early Childhood Education

Publisher

Teachers College Press
Orders
PO Box 20
Williston, VT 05495-0020
Toll-free: (800) 575-6566
Fax: (802) 864-7626
E-mail: tcpress@www.tc.columbia.edu
URL: <http://www.tc.columbia.edu/~tcpress/>

1 text: ISBN: 0-8077-2707-5 **$18.95**

Author

Constance Kazuko Kamii with Georgia DeClark; foreword by Barbel Inhelder

This book, part of the *Early Childhood Education* series, describes how to teach numerals and place value to children in first grade, as well as how to introduce the concept of repeated addition. Intended for primary teachers, administrators, curriculum specialists, and evaluators, the book describes and applies Piaget's theory of learning: children learn by constructing concepts internally, through their own thinking. The author argues that traditional arithmetic instruction is counterintuitive to the way young children think and that there are better ways of teaching arithmetic in the primary grades. Written in collaboration with a classroom teacher, the book advocates breaking with traditional instruction, relying instead upon situations from daily living, such as counting votes, and group games that involve math skills. A description is given of a constructivist program being implemented in an actual first grade classroom, including games, problem solving activities, and class discussions that demonstrate how children construct their own arithmetic strategies. For example, in an activity called Double Parcheesi, the rules for regular Parcheesi are followed, except that players double the number on a ten-sided die for each move. The final sections of the book present an evaluation of the first grade program and the effects of the constructivist teaching approach on the way children learn. (Author/LDR) [ENC-008997]

► *Related Resources*

ENC has other items in this series in its collection:

Young Children Continue to Reinvent Arithmetic—2nd Grade: Implications of Piaget's Theory
This book discusses and illustrates how children in grade 2 invent ways of performing arithmetic operations, even though they have not been trained in performing such operations through the traditional textbook and drill method. Goals of arithmetic instruction are discussed and evidence presented to support constructivism and the importance of social interaction in the classroom. [ENC-008995]

Young Children Continue to Reinvent Arithmetic—3rd grade: Implications of Piaget's Theory
This book introduces multidigit multiplication in grade 3, focusing on children's thinking as they reinvent this arithmetic operation. The authors detail their meticulous observation of what children actually do in solving math problems, offering a theoretical interpretation of the children's mental processes. The book's final sections answer frequently asked questions about the program and present evidence of its evaluation. [ENC-008993]

Grade K

Mr. Wizard: Wood

1996

Series: Teacher to Teacher with Mr. Wizard

Publisher

Mr. Wizard Foundation
4480 Helm
Plymouth, MI 48170
Toll-free: (800) 258-2344

1 video (Series 9, Programs 43–48): **$25.70**

Author

Executive producer, Don Herbert (Mr. Wizard); co-executive producer, Dennis Harlan; associate producer, Norma Herbert; program producer, Joe Moorehouse; produced by Mr. Wizard Foundation

This video, part of a series hosted by Don Herbert (Mr. Wizard), demonstrates how the scientific method is used by young students throughout a comprehensive woodworking module. The series features sequences of classroom elementary teachers using hands-on, inquiry-based instructional methods designed to excite young students about science and learning. This video was filmed in a kindergarten class in Huntsville, Alabama. Topics covered in the first four sections include shaping wood with sandpaper, creating plywood and particle boards, and building wood sculptures with a hammer and nails. The video also discusses graphing and data analysis and examines whether sawdust and wood shavings float in water. Processes and concepts addressed include cooperative group learning, prediction, and recording data, as well as moving from the concrete mode of thinking to the abstract and recalling prior experiences. The video features interviews with Pam Patrick, a teacher who successfully implemented this woodworking module in her classroom in Huntsville, as well as live interactive interviews with Patrick and her students. Additional interviews highlight other educators and community learners who support introducing science concepts to kindergarten students. The video's last section describes how the school district, the chamber of commerce, and a local university collaborated to reform elementary science education in Huntsville. (Author/CCM) [ENC-008551]

Related Resources

ENC has other volumes of the Mr. Wizard Series in its collection:

Floating and Sinking
This video features teacher Nancy Chapel and her third and fourth grade students learning about buoyancy. In this program, students conduct an experiment on water displacement, weigh submerged objects, and explore why some things float and others sink. They also compare the weight of salt and fresh water, predict the effect of salt water on the buoyancy of objects, build their own boats from a variety of materials, and test whether these boats will float. Throughout the program, Chapel provides background information about concepts highlighted in these hands-on experiments. In addition, the tape shows how she builds a safe and trusting environment for learning, creates rapport with students, and employs a variety of techniques to help her students learn. Also demonstrated is the way in which she encourages children's active participation in the learning process and designs questions to recognize each student's level of understanding. [ENC-006969]

Batteries and Bulbs
This video is designed to show teachers of grade 6 how to teach the concept of electricity. This program features JoAnn DeMaria's sixth grade students using their knowledge of electricity to determine the content of eight different electrical mystery boxes. Students test for the presence of batteries and bulbs in the mystery boxes, examine electrical circuits of the sort that might be present in the boxes, compare circuits, and design their own mystery box. In addition, the program shows how JoAnn encourages children's active participation in the learning process, creates rapport with students, assesses each student's level of understanding, builds a safe and trusting environment for learning, and promotes appropriate behavior in the classroom. The tape also takes a detailed look at the Fairfax County's Resource Center and describes how the Center has been supplying teachers with instructional materials. [ENC-006617]

Grades 2–8

Writing in Math Class: A Resource for Grades 2 to 8

1995

Distributor

Cuisenaire Company of America, Inc.
10 Bank Street, PO Box 5026
White Plains, NY 10602-5026
Telephone: (914) 997-2600
Toll-free: (800) 237-3142
Fax: (914) 997-2192
E-mail: info@cuisenaire.com
URL: <http://www.cuisenaire.com>

1 text: ISBN: 0-941355-13-6; Order #: EN701-036118 **$18.95**

Publisher

Math Solutions Publications (White Plains, NY)

Author

Marilyn Burns

Standards

NCTM Standards (1989). Content Standards: Grades K–4. Mathematics as communication
Content Standards: Grades 5–8. Mathematics as communication

This resource book uses anecdotes and samples of student writing to address why and how writing should be an integral part of the mathematics classroom. The first three chapters examine the current instructional goals for mathematics as outlined in the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989). The author explains that writing is one form of communication that both supports students' learning and helps teachers assess students' understanding. The next four chapters provide descriptions, examples, and anecdotes from the author's classroom experience. Included are different types of writing assignments, such as keeping journals, solving mathematical problems, explaining mathematical ideas, and linking creative writing and mathematics. The remaining chapters present tips and suggestions for making writing an integral part of mathematics instruction, including ways to help students write, the benefits of cooperative learning, and suggestions for giving feedback. A final section addresses questions teachers frequently ask about writing in the mathematics classroom. An appendix correlates cited lessons with expanded versions in other books. (Author/GMM) [ENC-007721]

► *Related Resources*

ENC has other resources in its collection that explore the use of writing in mathematics instruction:

Writing to Learn Mathematics: Strategies that Work, K–12
This book describes writing activities teachers of grades 7–12 can use to help students become active participants in learning mathematics. Student writing samples demonstrate learners interpreting unfamiliar texts, constructing arguments, struggling to understand complex systems, and developing new approaches to problems. [ENC-006415] Heinemann Educational Books, Inc., toll-free: (800) 541-2086

The Write Tool to Teach Algebra
This book contains lesson plans and reproducible teacher aids to help teachers overcome student resistance to mathematics through writing exercises that are entertaining and promote critical thinking. Each lesson includes teaching suggestions, discussion questions, writing activities, grading suggestions, and follow-up activities. [ENC-005575] Key Curriculum Press, toll-free: (800) 338-7638

Grades 1–8

About Science IMAGES: Visions of Effective Science Instruction

1995

Series: Science IMAGES Visual Library

Publisher

Corporation for Public Broadcasting
Annenberg / CPB Math and Science Collection
PO Box 2345
South Burlington, VT 05407-2345
Toll-free: (800) 965-7373

1 complete set (9 videos + 3 guides): **$315.00**
Note: Individual videos and guide books may be purchased separately. Contact publisher for details.

Author

Produced by North Central Regional Laboratory (NCREL); project director, Randy Knuth; producers, Louis M. Ciancio, Jr., Debora Pitlik

Funding

Annenberg/CPB Math and Science Project

This video series and accompanying guide books, developed for teachers of grades 1–8, show the process of science instruction by capturing several days in typical science classrooms, including normal changes of plan and interruptions. The series comprises eight 45 minute programs. Each program begins with a quick review of a science concept and then shows the lesson in progress as students observe, analyze, develop theories, and come to conclusions. In addition, each teacher reviews the response of the class and evaluates the lesson. In sample programs students learn about the human body as they compare and contrast features of their own bodies (grade 1); gather population data from gravestones in the local cemetery to examine the process of scientific inquiry (grade 5); and use computers to observe, graph and analyze data, then confirm predictions via e-mail with university scientists during a lesson on "What happens to light as you move away?" The guide books were developed for viewers, workshop facilitators, and leadership teams. The viewer's guide helps educators adapt the video's teaching strategies to their own classrooms, providing detailed descriptions of the eight lessons with a summary of science content, typical conceptual difficulties students might have, and unit and lesson plans with possible assessment strategies. Also provided are comments from education specialists on what happened in the classrooms and suggestions for related activities and for classroom management. The workshop facilitator's guide provides information and activities to help create units within a professional development framework, as well as supporting resources and two workshop outlines. The leadership team guide helps administrators establish an extended professional development program, providing tips on how to build a team of administrators, educators, parents, and community leaders, and how to plan, publicize, and evaluate the program. Reproducible masters of professional development forms and questionnaires are also provided. [ENC-009485] (Author/LCT)

Related Resources

Also available from Annenberg/CPB:

Visualizing Growth: Changing the Way We Teach Science
This video collection and accompanying resource guide document the experiences of elementary teachers as they work with museum curators at the Buffalo Museum of Science. Brought together by Project TEAM (Teacher Education at the Museum), teachers work in the field and in laboratories under the guidance of working scientists to deepen their understanding of the natural world. The collection comprises nine 30-minute videos that illustrate how the school-museum partnerships introduce teachers to botany, vertebrate and invertebrate zoology, geology, archaeology, urban ecology, and physical science. Each program portrays real teachers using their curatorial experience to improve their teaching methods, address individual professional development issues, and brainstorm ways in which they can engage their students in similar museum-inspired experiences. For example, the hands-on learning at the museum helps one teacher better understand how to use simple machines to teach physics. Other teachers choose outdoor experiences that allow their students to observe ducks in their natural habitat, collect and observe insects in a local park, and collect fossils from a local quarry. The resource guide provides an overview of each program, as well as suggested discussion questions, background information, and a list of additional resources. [ENC-009488]

Grades 9–12

Teaching Math: A Video Library, 9–12

1996

Series: Teaching Math

Publisher

Corporation for Public Broadcasting
Annenberg / CPB Math and Science Collection
PO Box 2345
South Burlington, VT 05407-2345
Toll-free: (800) 965-7373

1 complete set (10 videos + guide book):
$250.00

Author

Videotapes: developed by the Educational Programming Group of the Special Telecommunications Services division, WGBH Educational Foundation; executive producers, Lynn Cadwallader, Michele Korf

Guide book: developed by the Educational Outreach department of the Special Telecommunications Services division, WGBH Educational Foundation; editor/writer, Karen Jersild; writers, Henry Kepner, Carol Malloy, Ruth Tsu

Funding

Annenberg/CPB Math and Science Project

This video library is designed for use in preservice and inservice workshops, by individual teachers, in parent-teacher association meetings, and by school administrators. It features visual examples of mathematics teaching and learning to aid teacher development. The goal of the project was to find examples of dynamic high school teaching that illustrate the curriculum content and process areas outlined in the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989). The collection includes an introductory video, five tapes containing real, unscripted lessons on different content areas, and four videos that focus on communication, reasoning, connections, and problem solving lessons. The videos provide viewers with an opportunity to observe a wide range of teacher-created lessons from various curricula in diversified educational settings. Different lessons include applications to real-life situations, technology use, and problems with more than one correct solution. In one content area video, for example, a teacher in a Boston high school conducts a small group activity with ninth graders in which students try to find a pattern that tells how many blocks are needed to make different-sized staircases. Each group uses paper squares to build several staircase models, records their data, and writes down questions that they encounter. The teacher moves from group to group asking and answering questions. Each video ends with analysis questions intended to spark reflection and discussion. In the staircase activity, for example, one question asks how the teacher's questions encouraged reasoning. Selected videos include students' reactions to the classroom activities. Also included is a guide book with individual units to accompany each tape. Each unit contains a list of the NCTM standards featured in the lesson, a summary of the videotape, and an exploration activity, as well as information about the classroom and a list of discussion ideas. (Author/KFR) [ENC-009487]

Related Resources

ENC has other items of the *Teaching Math* video series in its collection::

Teaching Math: A Video Library, 5–8
Each tape in this video library takes viewers inside a middle school classroom, where they see a teacher setting up a lesson and sit in with students as they work. The videos exemplify aspects of high quality mathematics education as described in the NCTM *Standards* and explore some of the issues teachers face as they try to implement reform and improve mathematics education. [ENC-009489]

Teaching Math: A Video Library, K–4
This video library, which documents effective teaching and learning in a variety of schools, is meant for use in professional development workshops or programs for teachers of grades K–4. The video segments, along with the guide book, illustrate how teachers nationwide are putting the NCTM *Standards* to work in their classrooms. The tapes show new, veteran, and bilingual teachers inspiring curiosity through open-ended discussions, discovering innovative ways to use manipulatives, enhancing lessons through group work, and connecting lessons to the lives of their students. [ENC-009486]

ENC Focus

Internet Resources for Professional Development

ENC has cataloged a number of Internet resources devoted to providing educators with information about professional development opportunities. The following are just a few of the many available in Resource Finder. To locate more, try searching under subject: "professional development," resource type: "World Wide Web." You can also visit ENC's Professional Development Exchange to find more opportunities and information. To get to the Exchange, look in the Ideas section of ENC Online and select the Professional Development Exchange link.

TeachNet

URL: <http://www.teachnet.org/>

This Web site is the home page of the Teachers Network, a nationwide, nonprofit organization that supports innovative teaching in the public schools. The site provides teachers with opportunities to exchange ideas and learn about funding opportunities. The Opportunities section allows teachers to search a growing database of grants, fellowships, awards, scholarships, and free materials. The Let's Talk section is a bulletin board for sharing ideas and input about educational issues, educational technology, and policy issues in public education. In the daily Blue Plate Special, teachers can find ideas for homework assignments (K–3); classroom-ready activities; assessment and research strategies; advice for new and substitute teachers; and suggestions for working with parents. A sample classroom activity asks students to construct, test, redesign, and retest a model paddlewheel boat. Links to additional Web sites and site reviews are also provided. (Author/LCT) [ENC-008733]

The Math Forum

URL: <http://forum.swarthmore.edu/>

This Web site is a center for teachers, students, researchers, parents, educators, and citizens at all levels who have an interest in mathematics education. The philosophy is to collect Internet and/or teacher-initiated mathematics resources and to organize the topics by subject so that the resources can be readily accessed. The topics range from kindergarten to adult levels and include professional organizations, teacher resources, student activities, and research topics and reports. There is a problem of the week for elementary grades, and for high school geometry, a geometry project of the month. Resources for elementary, secondary, post secondary, and graduate school teachers are included as well as for those doing research and wanting to discuss a topic or to find materials, sources, or publications. Mathematics issues include equity and access, calculus reform, and interdisciplinary mathematics. (Author/LDR) [ENC-004498]

Tales from the Electronic Frontier

URL: <http://www.WestEd.org/tales/>

At this site, users can find the electronic version of the book *Tales from the Electronic Frontier: First-hand Experiences of Teachers and Students Using the Internet in K to 12 Math and Science*. The book and Web site are products of the WestEd Eisenhower Regional Consortium for Science and Mathematics Education (WERC), an organization that promotes systemic change in science and mathematics education. In *Tales*, 10 teachers share actual classroom experiences using the Internet. Their first-hand accounts illustrate how the Internet can enhance teaching and learning. Drawing on teacher successes and dilemmas, *Tales* can help expand classroom resources, engage students in new ways and connect with other teachers. It offers more than 50 annotated resources, including information about online math/science organizations and Web sites. The stories illustrate how this technology can be used in different contexts and for different purposes. Additional topics include software compatibility, designing online projects, publishing student projects electronically on the World Wide Web, and using the Internet to prepare for field investigations. For each story, the text addresses instructional issues such as urban environmental education, project-based science, developmental and curricular issues, variables affecting student data, and accommodating students with disabilities. (Author/LCT) [ENC-004277]

Pathways to School Improvement

URL: <http://www.ncrel.org/sdrs/pathwayg.htm>

This Web site, maintained by the North Central Regional Educational Laboratory (NCREL), is designed to help schools find their way through the School Improvement Cycle. This cycle is self-regulating, allowing teams to choose what schools should be, how they should operate, and in what ways they need to improve their approaches to teaching and learning. The goal of Pathways is to provide teachers, administrators, and parents with resources for improving education in their classrooms. The site contains articles written by professionals from leading educational research centers and universities about many topics dealing with school reform, such as assessment, leadership, and technology use. Practical examples are provided as well as an inventory for assessing the progress of the reform planning process. Some of the areas related to science and mathematics education deal with using Internet-based materials, ensuring equity and excellence in instruction, and providing authentic learning experiences. (Author/SSD) [ENC-002454]

ENC Focus

Internet Resources for Professional Development

ERIC/CSMEE: Clearinghouse for Science, Mathematics, and Environmental Education

URL: <http://www.ericse.org/>

This site is the home page of the ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC CSMEE). The Clearinghouse collects and processes all the science, mathematics, and environmental education materials included in the ERIC database, and it also offers products and services of special interest to educators. This site features access to a list of the journals indexed by ERIC CSMEE, as well as to Clearinghouse publications such as ERIC Digests, Bulletins, Curriculum Files, monographs, and educational resource books. Digests are information sheets that highlight topics of interest in science, mathematics, and environmental education. Bulletins and Curriculum Files are 4–12 page articles that treat specific topics in greater depth. The Digests, Bulletins, and Curriculum Files are public domain documents available online and can be copied. The site provides links to other sites related to science, mathematics, and environmental education, as well as connections to the ERIC System and the ERIC Database. Highlighted links are to sites that provide lesson plans or information about organizations promoting science, mathematics or environmental education. (Author/GMM) [ENC-002471]

National Center for Research on Evaluation, Standards, and Student Testing (CRESST)

URL: <http://cresst96.cse.ucla.edu/index.htm>

This site contains information about current issues in assessment, presented in a variety of formats such as newsletters, technical reports, general interest papers, and assessment resources. It includes publications such as current and past issues of the CRESST Line newsletter, the Evaluation Comment newsletter, and a General Interest file. The site features a databse with more than 250 sources of alternative assessments developed by a variety of agencies in the United States and overseas. These assessments are designed to be used by teachers, school district administrators, assessment developers, and others interested in new methods for assessing student growth. The database contains detailed information about each assessment, including subject matter and skills measured, assessment type and purpose, scoring characteristics, and availability of the assessment. Many of the new assessments contain short answer and essay questions, demonstrations, use of manipulatives, hands-on tasks, nonstandard written products, and experiments. The site also includes links to other relevant sites, such as the United States Department of Education or the American Educational Research Association. (Author/ LDR) [ENC-002645]

Barrier Free Education (BFE)

URL: <http://atlanta.arch.gatech.edu/BFE/>

This Web site provides useful information to teachers, parents, and students about fulfilling the promises of equal access to education and of the inclusion of students with disabilities in math and science education. The site's creators assume that, although there is general agreement as to the goal of barrier-free education, actual achievement of specific objectives is rarely easy. The site is designed to address the issues of academic access by focusing on two issues: tools and strategies that help adapt existing curricular materials for use by students with disabilities and revising curricula to promote higher levels of inherent universal access. This site offers tools and strategies for accommodating specific disabilities, lessons modified to reflect curriculum adaptations, and stories of successful students with disabilities. The site's suggestions and guidelines are aimed at supporting the problem solving abilities of all participants in the education process. Therefore, the content of this site is composed of generic descriptions of educational challenges, along with general solutions to those opportunities for accommodation. Links to specific rehabilitation and education resources are supplied. (Author/KFR) [ENC-009404]

Fermilab LInC

URL: <http://www-ed.fnal.gov/linc/linc_home.html>

Fermilab, the U.S. Department of Energy's national laboratory on matter and energy, maintains this site to provide all the materials for a course providing teacher-leaders with training on how to integrate Internet resources into the curriculum. The course, which consists of 20 four-hour sessions, requires that participants commit to teaching other teachers how to use the Internet in their own classrooms. The training includes topics such as identifying effective teaching strategies for using telecommunications, learning how to find and use Internet resources, and publishing documents on the Internet. Users have access to LInC course materials from spring and fall of 1995 and from spring, summer, and fall of 1996. A link to the LInC Project Index provides access to elementary, middle school, and high school projects designed by K–12 teachers who participated in Fermilab's staff development program. Links to additional education sources are also provided. (Author/FEB) [ENC-009312]

ENC Focus

Professional Development Organizations

There are a great many organizations dedicated to providing teachers with professional development and growth opportunities. The following list is just a small sampling of the variety of organizations that provide such opportunities to teachers. To find these and others like them, try searching ENC Online under Ideas, Reform Links, Professional Organizations.

American Association of Physics Teachers
URL: <http://www.aapt.org/>

The American Association of Physics Teachers, formed over 60 years ago, is committed to supporting the advancement of the physics education profession and to providing educators with the resources they need. The association's Web site features professional development opportunities, schedules of upcoming meetings and workshops, and information about its publications, including the *American Journal of Physics*. Also featured are links to related physics and science links, such as the American Physical Society and the American Institute of Physics.

American Association of Physics Teachers (AAPT)
One Physics Ellipse
College Park, MD 20740-3845
Telephone: (301) 209-3300
Fax: (301) 209-0845

The Association for Supervision and Curriculum Development (ASCD)
URL: <http://www.ascd.org/>

ASCD is an international, nonprofit, nonpartisan education association committed to the mission of forging covenants in teaching and learning for the success of all learners. Founded in 1943, ASCD provides professional development in curriculum and supervision; initiates and supports activities to provide educational equity for all students; and serves as a leader in education information services. ASCD's annual conference gathers more than 13,000 educators. The Association also offers programs throughout the year in cities around the globe via conferences that focus on emerging issues; interactive Internet courses; international meetings; and professional development institutes. ASCD distributes a variety of journals, newsletters, books, and audio- and videotapes each year. Regular publications include *Educational Leadership*, *The Journal of Curriculum and Supervision*, and *Education Update*.

The Association for Supervision and Curriculum Development
1250 North Pitt Street
Alexandria, VA 22314-1453
Toll-free: (800) 933-ASCD
Telephone: (703) 549-9110
Fax: (703) 299-8631

The International Technology Education Association (ITEA)
URL: <http://www.iteawww.org>

ITEA is a professional educational association and information clearinghouse devoted to enhancing technology education through experiences in K–12 schools. Its membership includes individuals and institutions around the world, with the primary membership being in North America. ITEA's mission is to advance technological capabilities for all people, to promote the professionalism of those engaged in these pursuits, and to improve public understanding of technology education and its contributions. Visitors to ITEA's Web site can view information about upcoming conferences, learn about grant and scholarship opportunities, and link to Web sites of K–12 schools, affiliate organizations, and other notable Internet resources.

The International Technology Education Association (ITEA)
1914 Association Drive
Reston, Virginia 20191-1539
Telephone: (703) 860-2100
Fax: (703) 860-0353

National Association of Biology Teachers
URL: <http://outcast.gene.com/ae/RC/NABT/>

The National Association of Biology Teachers (NABT) was formed in 1938 and has a membership of more than 7,000 biology educators and administrators representing all grade levels. It is the only national association dedicated exclusively to the concerns of biology and life science educators. NABT's National Convention, held each fall, gives biology educators an opportunity to interact with one another, learn about research and technological updates, participate in hands-on workshops, present their own research papers, join field trips, meet special invited speakers, and honor their outstanding colleagues. NABT is also involved in the development of national curriculum, teaching, and assessment standards and participates in the Council for Scientific Society Presidents, the Alliance for Environmental Education and the Triangle Coalition, which links educators, scientists

Professional Development Organizations

and industry in a cooperative effort to improve science education. NABT is actively involved in the Commission for Biological Education of the International Union of Biological Sciences.

National Association of Biology Teachers
11250 Roger Bacon Drive, # 19
Reston, VA 22090
Telephone: (703) 471-1134

The National Council of Teachers of Mathematics (NCTM)

URL: <http://www.nctm.org/>

Founded in 1920, NCTM is a nonprofit professional association dedicated to the improvement of mathematics education for all students in the United States and Canada. It offers vision, leadership, and avenues of communication for those interested in the teaching and learning of mathematics at the elementary school, middle school, high school, college, and university levels. Each year, NCTM conducts a large national conference and six to eight regional conferences, at which teachers of mathematics and others interested in mathematics education can attend lectures, panels, and workshops and can see exhibits of the latest mathematics education materials and innovations.

The National Council of Teachers of Mathematics (NCTM)
1906 Association Drive
Reston, Virginia 20191-1593
Telephone: (703) 620-9840
Fax: (703) 476-2970

The National Science Teachers Association (NSTA)

URL: <http://www.nsta.org/>

The NSTA is the largest organization in the world committed to promoting excellence and innovation in science teaching and learning for all. Founded in 1944, NSTA's current membership of more than 53,000 includes science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in science education. The Association serves as an advocate for science educators by keeping its members and the general public informed about national issues and trends in science education. NSTA disseminates results from nationwide surveys and reports and offers testimony to Congress on science education-related legislation and other issues.

National Science Teachers Association (NSTA)
1840 Wilson Boulevard
Arlington, Virginia 22201-3000
Telephone: (703) 243-7100

The National Middle School Association (NMSA)

URL: <http://www.nmsa.org/>

Established in 1973, National Middle School Association (NMSA) serves as a voice for professionals, parents, and others interested in the educational and developmental needs of young adolescents (youth 10–15 years old). NMSA is the only educational association exclusively devoted to improving the educational experiences of young adolescents. The Association has established a list of elements considered to be essential indicators of a successful middle school, including: educators knowledgeable about the needs and characteristics of young adolescents; teacher preparation and staff development programs that address these needs; a balanced, relevant, and integrated curriculum that truly reflects the nature and needs of young adolescents; and cooperative school-wide planning that involves faculty, administration, students, and parents. NMSA provides professional opportunities, varied services, and publications for all professionals and persons interested in the developmental and educational needs of young adolescents. Publications include the *Middle School Journal*, member newsletters and newspapers, more than 50 monographs, and the scholarly *Research in Middle Level Education* journal. Professional development opportunities include an urban education conference, distance learning programs, overseas study tours, a series of regional and topical institutes, and an annual conference that has drawn over 8,000 professionals from the United States and around the world.

National Middle School Association
Corporate Exchange Drive, Suite 370
Columbus, OH 43231-1672
Toll-free: (800) 528-NMSA
Fax: (614) 895-4750

Eisenhower National Clearinghouse for Mathematics and Science Education

Ordering Instructions for ENC CD-ROMs

The Eisenhower National Clearinghouse for Mathematics and Science Education (ENC) has issued the second and third volumes of CD-ROMs (two discs in each volume). Each volume of ENC CD-ROMs includes Resource Finder, a catalog of mathematics and science curriculum materials.

The second volume features stories of teachers across the country striving to implement innovative teaching methods in their districts and original research papers by leaders in math and science education.

The third volume covers important topics in math and science education today. The theme of one disc is equity in the math and science classroom, with classroom stories and resources for discussing and working on equity challenges. The other disc in the third volume centers on the Third International Math and Science Study, with a toolkit and additional materials to help teachers understand this important student assessment.

Ordering free ENC CD-ROMs

One of each ENC CD-ROM will be provided free to schools requesting it. Those schools that request an ENC disc will receive all subsequent volumes. Therefore, if you have requested an earlier disc, you do not need to send in a new request form to receive future volumes.

Requests by schools for free CD-ROMs must be forwarded to ENC by mail or fax and MUST be accompanied by a letter on school letterhead signed by the principal. Schools must supply complete information on the form in order to receive the free CD-ROMs.

Equipment Requirements

The minimum equipment requirements for using the ENC CD-ROMs are a Macintosh with a 68030 processor or better OR a DOS-compatible machine running Windows 3.11 or later. Additionally, 10 megabytes of hard disk storage space are needed and 6 megabytes of RAM (8 megabytes preferred).

Purchasing additional CD-ROMs

Although one copy of each disc is free to every school, additional copies can be purchased. ENC's second volume (two discs) is available through the Superintendent of Documents for the Government Printing Office (while supplies last). The cost for both disks is $20.

Call (202) 512-1800 and order stock no. 065-000-01000-3.

Send requests for free CD-ROMs to:
Eisenhower National Clearinghouse
The Ohio State University
1929 Kenny Road
Columbus, OH 43210-1079
Fax: (614) 292-2066

For additional information:
Phone: (800) 621-5785 or (614) 292-7784
E-mail: cd_request@enc.org

SCHOOL REQUEST

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District

Address

City/State/Zip

Person/Position to whom disk should be sent

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- ❑ *Library/Media Center*
- ❑ *Teacher Resource Center*
- ❑ *Other (please describe)*
- ❑ *Classroom*
- ❑ *Computer Lab*

Computer system you will be using to play the CD-ROM (make and model)

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IBM/PC Compatible/Windows:

Eisenhower National Clearinghouse for Mathematics and Science Education

Eisenhower National Clearinghouse
The Ohio State University
1929 Kenny Road
Columbus, OH
43210-1079
Voice: (800) 621-5785
Fax: (614) 292-2066

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- ❑ *ENC Update (future issues)*
- ❑ *Guidebook of Federal Resources for K–12 Mathematics and Science*
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❑ *A school administrator* ❑ *A district administrator* ❑ *A librarian*
❑ *A teacher educator* ❑ *A college faculty member* ❑ *Other*_____

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Directory of Eisenhower Mathematics and Science Regional Consortia

Appalachia Region

Eisenhower Regional Math/Science Consortium at AEL
Appalachia Educational Laboratory
PO Box 1348
Charleston, WV 25325-1348
Phone: (800) 624-9120 / Fax: (304) 347-0487
States Served: Kentucky, Tennessee, Virginia, West Virginia

Far West Region

WestEd Eisenhower Regional Consortium for Science and Mathematics Education
WestEd Regional Educational Laboratory
730 Harrison Street
San Francisco, CA 94107
Phone: (415) 241-2730 / Fax: (415) 241-2746
States Served: Arizona, California, Nevada, Utah

Mid-Atlantic Region

Mid-Atlantic Eisenhower Consortium for Mathematics and Science Education
Research for Better Schools
444 North Third Street
Philadelphia, PA 19123-4107
Phone: (215) 574-9300 / Fax: (215) 574-0133
States Served: Delaware, Washington DC, Maryland, New Jersey, Pennsylvania

Mid-Continent Region

Eisenhower High Plains Consortium for Mathematics and Science
Mid-continent Regional Educational Laboratory
2550 South Parker Road, Suite 500
Aurora, CO 80014
Phone: (303) 743-0990 or (800) 949-6387
Fax: (303) 337-3005
States Served: Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, Wyoming

North Central Region

Midwest Consortium for Mathematics and Science Education
North Central Regional Education Laboratory
1900 Spring Road, Suite 300
Oak Brook, IL 60521-1480
Phone: (630) 571-4700 / Fax: (630) 571-4716
States Served: Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, Wisconsin

Northeast and Islands Region

Eisenhower Regional Alliance for Mathematics and Science Education Reform
TERC
2067 Massachusetts Avenue
Cambridge, MA 02140
Phone: (617) 547-0430 / Fax: (617) 349-3535
States/Areas Served: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, Puerto Rico, Virgin Islands

Northwest Region

Science and Mathematics Consortium for Northwest Schools
Columbia Education Center
11325 SE Lexington
Portland, OR 97266-5927
Phone: (503) 760-2346/Fax: (503) 760-5592
States Served: Alaska, Idaho, Montana, Oregon, Washington

Pacific Region

Pacific Mathematics and Science Regional Consortium
Pacific Region Educational Laboratory
828 Fort Street Mall, Suite 500
Honolulu, HI 96813
Phone: (808) 533-6000 / Fax: (808) 533-7599
States/Areas Served: American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia (Chuuk, Kosrae, Pohnpei, Yap), Guam, Hawaii, Republic of the Marshall Islands, Republic of Palau

Southeast Region

SERVE Consortium for Mathematics and Science Education
SouthEastern Regional Vision for Education
345 South Magnolia Drive, Suite E-22
Tallahassee, FL 32301-2950
Phone: (904) 671-6033 / Fax: (904) 671-6010
States Served: Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina

Southwest Region

Eisenhower Southwest Consortium for the Improvement of Mathematics and Science Teaching
Southwest Educational Development Laboratory
211 East Seventh Street
Austin, TX 78701-3281
Phone: (512) 476-6861 / Fax: (512) 476-2286
States Served: Arkansas, Louisiana, New Mexico, Oklahoma, Texas

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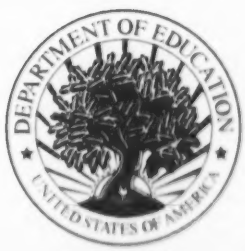

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